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MOTOR AGE

World's Critics Gather at Olympia Show

England's Great Exhibition Attracts 111 Different Makers of Cars—Final Worm Drive, Silent Chain and Sleeve-Valve Motors Are Constructional Features

By J. S. Critchley

LONDON, Nov. 3—The Olympia motor show, the tenth organized by the Society of Motor Manufacturers and Traders, opened its doors today, with 111 distinct makes of cars on view, the cosmopolitan character of which may be judged by the census of nationality which shows forty-eight makes of British cars, thirty-six of French, six of American, six of German, five of Belgian, four of Italian, three of Swiss, two of Austrian and one of Dutch.

There are 310 separate and distinct exhibits in the English show, two more than last year. The hall is packed to its utmost capacity, and unless some larger place can be secured in the future or the show divided into two consecutive exhibitions, newcomers only can be accommodated by the retirement of those on the ground floor who have the first call because of their long connection with the society which promotes the show.

As this year the French manufacturers have decided that there will be no Paris show, all the continental novelties have been brought to London. Every year this city appears to become more and more the hub of the European motor trade, and probably more business is done during Olympia show time between manufacturers and agents from all parts of the world than is done at all the other European shows combined.

There is no diminution in the interest displayed. The man in the street

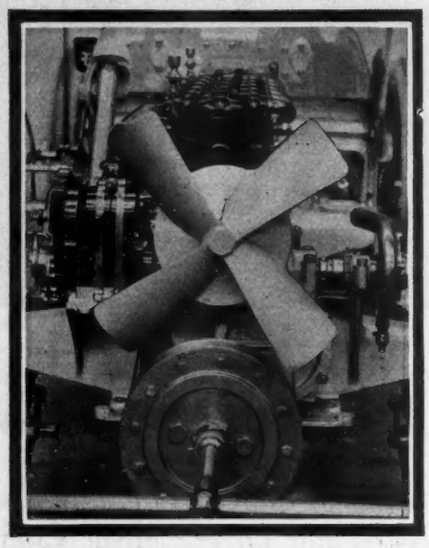

FIG. 1—FRONT VIEW OF 30-HORSEPOWER DAIMLER ENGINE VIBRATOR DAMPER

is just as much interested as the more fortunate visitor who is there to view the show and select the best money can buy.

The motor bus and the taxicab have, at any rate, as far as the metropolis is concerned, brought right home to the general public the use and the benefits the motor industry has provided, and therefore all and sundry bend their steps to the world's most comprehensive motor show.

Then again, the manufacturers, agents and designers from all parts of the world are now obliged to make a visit to Olympia a necessary duty, for in what other hall in the world can such a variety of the cars of different countries be seen? It is indeed a cosmopolitan display where the best and latest constructions and developments are viewed, not only by the prospective buyer, but by the student and the designer.

Engineers Attend Show

The visits of the agents from all parts of the world, as well as the engineers and designers from the chief motor building centers—America, France, Germany—does most assuredly tend to advance the cause of motoring throughout the world, not only from the business or commercial point of view, but also from the constructional and development side by the exchange of ideas and criticisms on details which are so necessary to all who desire to benefit by the advance in the art and science of motor car engineering.

It is more than evident that decided changes in construction are coming about. Silence in running or standing is the last word in car construction, and while much has been done to achieve that perfection of silence which is golden, much yet requires to be done. The renaissance of the chain drive is only one of the many factors which are being adopted to attain the end in view.

As far as Europe is concerned, it may be truly said that every manufacturer of renown is represented. America is not so well favored, and many cars from your country are shut out, for the reason that members of the society have first choice; newcomers, even when members, have to be placed at the bottom of the list, and so it inevitably happens that even some members of the society cannot be provided with space. The newer firms selling American productions, therefore, have no chance of obtaining space.

There has been some talk relative to a boycott of the American cars, but this cannot in fairness be substantiated. The open door has always been the policy of the society, which is clearly proved by the fact that small as the available space is the foreign firms exhibiting outnumber the British. All foreign cars handled by reputable traders have always been placed on equal terms with British goods.

The Knight engine makes slow but steady progress, and this year it is found fitted to another make of car, namely, the Deasy, in addition to the Rover product, which appears in two models with this type of engine. The Panhard firm has brought out a new 15-horsepower car which also will be fitted with this type of engine. A report is current that Giradot of C. G. V. fame has contracted for 2,000 Knight motors for a light car he is to build during the coming season.

Reference already has been made to the Argyll 25-horsepower engine with its single sleeve-valve motor. In spite of the very large number of patents which have been taken out for various valve arrangements, rotary and otherwise, it is surprising how few have developed into commercial use. There is, however, evidence that within a year or so some of these now experimental devices will soon be passed what may be termed the inertia stage, and in all probability at next year's show several new types of valve mechanism will be seen.

The adoption of automatic control for the ignition point is a matter which is receiving attention, and several arrangements of this description will be considered later.

The lighting dynamo is still a very expensive fitment, and until the price of this useful appliance can be considerably reduced there is little or no chance of universal adoption. Last year the Adams company included a dynamo in its equipments, and this year its example is followed by the Daimler company, which is fitting to its 30 and 38-horsepower, six cylinder cars a lighting dynamo placed beneath the foot board and driven through the medium of a light chain.

The exhibition shows a remarkable increase in the number of wire wheels fitted, and the detachable wheel, either in wood, iron or steel, is very quickly supplanting the detachable rim, and there appears to be little chance of a revival of this means for changing tires. For cheap cars, which are not fitted with the detachable wheel, the Stepney spare wheel seems to be almost universally adopted. It is, however, uncertain that the detachable wire wheel will maintain its present-day popularity. Detachable steel and wood wheels are being more and more brought into prominence, and it is on record that the wire wheel is not altogether as reliable as the former, owing to the trouble arising from occasional loose spokes.

Some Daimler Models

The Daimler company offers several models from the 15-horsepower four-cylinder type up to the 38-horsepower car, supplied with either a four or a six cylinder engine. In general, no important changes of design have been made. The engines have undergone no change, save that on the 30 and 38-horsepower six cylinder models, provision is made for driving the electric light dynamo which forms part of the standard equipment on these cars. Also, on the 20, 25 and higher powered models, a four-speed gearbox is provided. Otherwise, the transmission and general chassis arrangement is unaltered.

Interest at the show is centering on the two new models, the 20-horsepower and 30-horsepower. The engine has the cylin

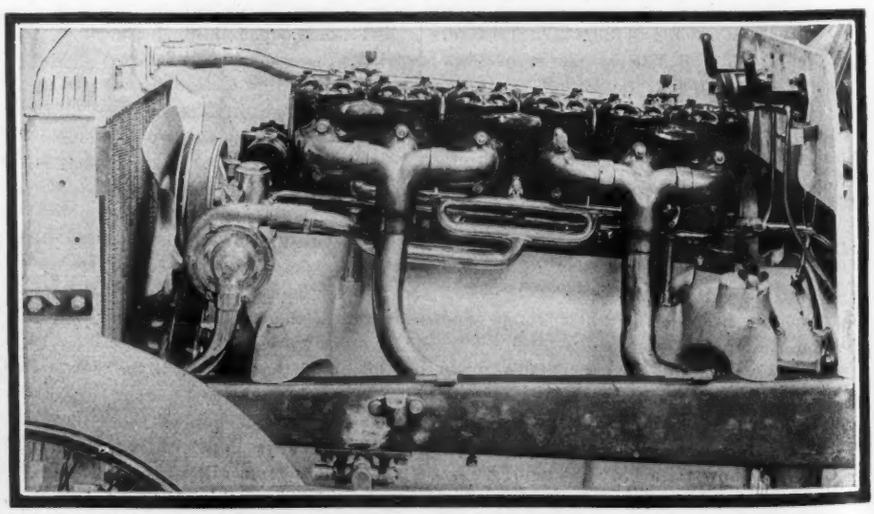

FIG. 2—EXHAUST SIDE OF 30-HORSEPOWER DAIMLER; ALSO SHOWING FRONT SPRING SHACKLE OF NOVEL DESIGN

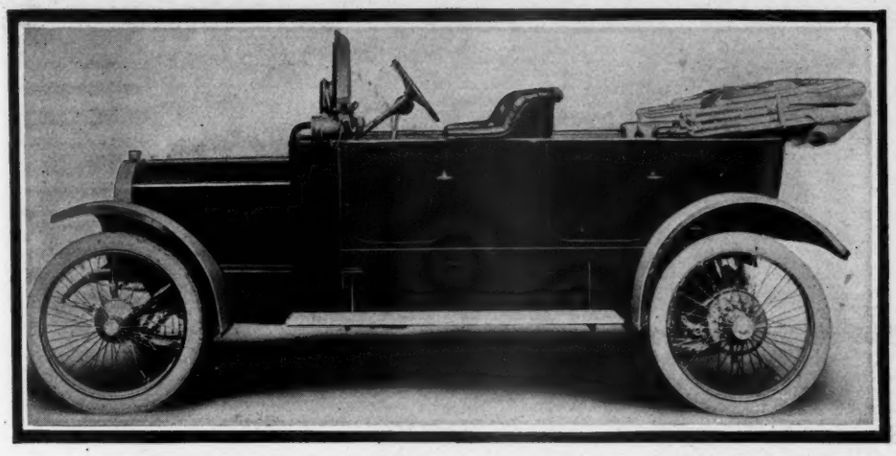

FIG. 4—NEW FOUR-CYLINDER B. S. A. LIGHT CAR, WHICH IS FASHIONED AFTER THE AMERICAN FORD LINES

ders cast in pairs, the bore and stroke being 90 by 130 millimeters or 3.54 by 5.1 inches. Detachable heads are fitted, the waterjackets in these being supplied from the cylinder jackets by an internal connection which dispenses with the necessity for external connecting piping. With the new arrangement there is no possibility of water leaking into the cylinders.

This pump, and the dual type magneto, are driven from a cross-shaft placed transversely at the front of the engine, and driven by spiral gears from the eccentric shaft. A silent chain is used to transmit the motion from the rear end of the crankshaft to the eccentric shaft. The crankshaft itself is ground up from a solid chrome-nickel steel stamping, and in the engine a bearing is provided between adjacent cylinders. The pistons are of cast iron of close grain, and the sleeves are made from a very tough grade of iron. No change has been made in the design of the sleeves and actuating gear; this part of the engine has proved itself to be quite satisfactory and free from trouble.

Lubrication Is Unchanged

The lubrication arrangements are similar to those employed on last year's cars, but the design of the engine has been modified, so that the pump, troughs and all parts of the system are connected to the top half of the base chamber, the bottom half acting simply as an oil reservoir. It will be remembered that the Daimler lubrication system employs a large plunger pump to draw the oil, which has previously filtered, out of the base, and to force this along separate pipes to a series of troughs, one placed beneath each connecting rod. As the crankshaft revolves, the scoops on the bottom of the connecting rods splash the oil to every bearing. An additional refinement is provided by hinging the troughs and connecting the actuating lever up to the throttle control, so that the trough is raised whenever the throttle is opened. Hence the supply of oil to the engine is automatically varied in accordance with the work which has to be done. In practice, this system has proved satisfactory, and the only attention required is the pouring in of a gallon of oil every 600 miles or so, according to the size of the engine.

On the six-cylinder models the Daimler vibration-damper is fitted to prevent the occurrence of the periodic tremor to which long six-cylinder crankshafts are liable. This device, Fig. 1, is perfectly successful in its object and the engines are vibrationless at all speeds. This was described in Motor Age of last week, Fig. 12, page 19. The final engine component which calls for notice is the air pump which forces the gasoline from the rear tank to the carbureter.

Dealing next with the transmission, the cone clutch is fitted and a new form of balanced flexible coupling connecting this to the gearbox. Four speeds are provided on all models except the 15 and 23 horsepower.

A special sliding universal joint is placed behind the gearbox so that the rear flexible joint has no sliding motion. This rearrangement is found to give smoother running on rough roads. Final drive is by worm drive, the worm being placed below the axle. To reduce the amount of work imposed on the universal joints, the engine and gearbox slope downwards to the rear, so that the drive from crankshaft to wormshaft is in a straight line when normal load is on the car.

The springing is the same as this year, the special features being the swivel shackles Fig. 2 at the back ends of the front springs, which relieve the frame of side twist when the axle rises obliquely, and also the auxiliary spiral springs at the rear of the car.

The latest B. S. A. car is, in many respects, somewhat of a departure from the previous practice of the Birmingham concern, but one must admit that all the features are governed by sound constructional principles. The new B. S. A. production built by the Daimler company after the design of many ideas of the American Ford car, stands in a class by itself rather than in the ranks of orthodox light cars. It is certainly a lightweight car, for weight saving on a more extensive scale has been adopted than has hitherto been the practice with British makers. It must, however, be noted that the reduction in weight has not been accompanied by any undue cutting down of vital parts or of bearing surfaces.

Daimler Engine Used on B. S. A.

As far as power is concerned, the engineers have not fallen into the too common mistake of fitting a diminutive engine, the bore and stroke being 75 by 114 millimeters, or 2.95 by 4.48 inches. It hardly is necessary to say that the engine is of the sliding-sleeve Daimler type. It has its cylinders Fig. 5, cast in pairs, with separate heads and rubber-ring water joints. The sleeves and their actuating mechanism are of the standard type. A silent chain is used to drive the eccentric shaft and the second chain drives the parallel shaft for the centrifugal water pump and the magneto, both of these accessories being accessibly placed. Three long bearings support the crankshaft, these bearings being lined with white metal.

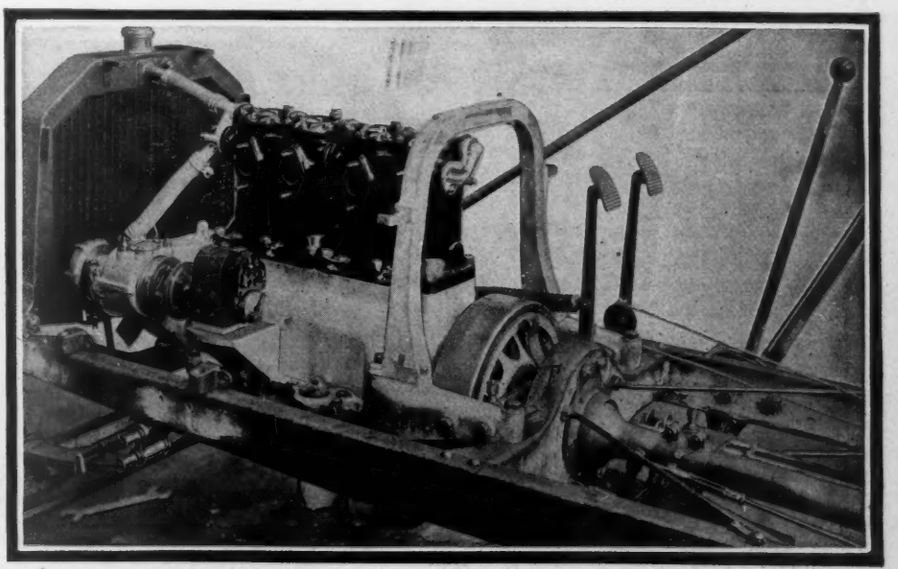

FIG. 5—VIEW SHOWING B. S. A. ENGINE OF SLIDING-SLEEVE DAIMLER TYPE

As regards the lubrication of the engine, the system adopted is that of pump-fed troughs, as in the Daimler motor. All the lubrication details, pump, troughs and piping, are supported by the top half of the base chamber; the bottom half acts merely as an oil reservoir and it can be removed for inspection of the engine bearings in a few minutes.

The other engine accessories are the centrifugal water circulation pump, the high tension magneto and the new type of two-jet carbureter, this giving good results as far as smooth and economical running is concerned.

Uses Three-Point Suspension

The engine is connected to the frame at three points, by a trunnion bearing at the front and by two projecting side arms at the rear. Immediately behind the engine is a strong frame cross member F; this is provided to support the universal joint at the rear of the cone clutch and to take the driving stress communicated from the torque tube. The three-speed gearbox is housed in a forward extension of the rear axle Fig. 6; this, though probably a new idea to many on this side, is in reality an old and well-proven method of construction. By its employment a considerable saving in weight is effected, and in addition very much less noise than usual is caused when the lower gears are in use. The gear-box compartment is separated by an oil tight division from the rear axle, so that the lubricant in each section may be kept separate. A convenient oil level gauge is provided for each component. The gear changes are effected by a gate lever, spring catches locking out of action all gears save the pair in use to prevent other gears accidentally slipping into mesh.

The rear axle is worm driven, the worm gears being of the Lanchester type—the worm is carried above the axle. The bevel

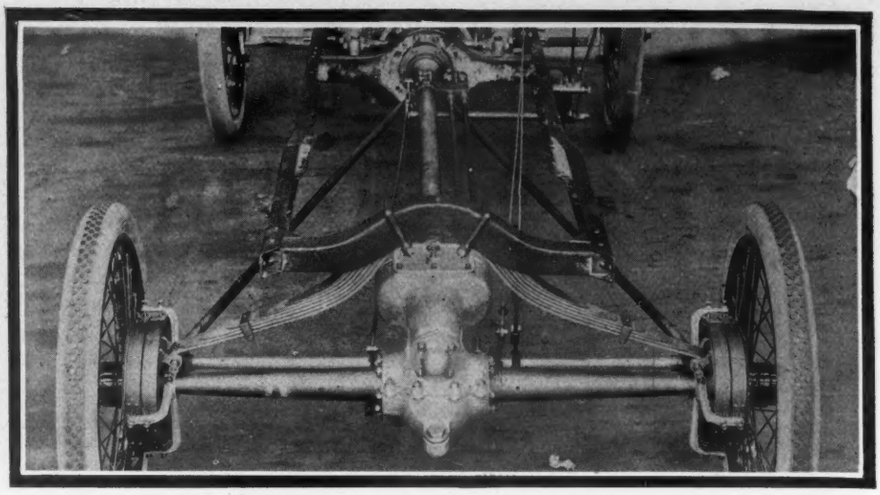

FIG. 6—REAR VIEW OF B. S. A. CHASSIS, SHOWING GEARBOX HOUSED IN FORWARD EXTENSION OF REAR AXLE

differential is housed in the worm-wheel casing and from here the two driving shafts lead to the wheel hubs. Ball bearings of large size are used throughout the transmission system. All the road wheels are of the detachable wire type, size 32 by 3.5 inches. Both sets of brakes are placed at the rear hubs. The springing of the car is arranged with semi-elliptics in front, and with a long arched and inverted transverse spring a la Ford at the rear. On the road the car is quite free from any tendency to roll. In the steering arrangements, the connecting links are placed well behind the front axle.

The wheelbase length of this chassis is 108 inches, the tread is 56.5 inches, and the weight is 1,100 pounds. The list price of the chassis is $1,250. The two-seater is priced at $1,500 and the flush-sided four-seated body at $1,625. In both of these cases the price includes full equipment of hood, screen, lamps and tool outfit.

The 25-horsepower Argyll chassis retains the worm drive of last year, Fig. 8, the worm W taking a position above the worm wheel W H, and the propeller shafts being sloped down toward the front of the car. Radial ball bearings B support the worm shaft and the double thrust bearing T is mounted in a housing at the rear end of the shaft. A convenient oil filler F is used. In Fig. 10 is shown a vertical section of the axle. Worm drive calls for careful lubrication and to do this a packing P is furnished. It is held in place by a spring S and the clamping ring C., with a positive lock L. This anti-leak device is carried on a housing E which is bolted between the differential housing and the axle sleeve. The use of radial bearings B1 and of thrust bearings T1 is shown.

Chain Drive for Sleeve Motion

Chain drive for the sleeve motion shaft is adopted in the motor. The sleeve, Fig. 7, is fitted with worms which rotate disks carrying eccentrically mounted spindles which are free to rock horizontally or at right angles to the sleeves. The spindles are coupled to the sleeves by pins and lugs cast on the lower extremity of the sleeves. The accessibility to the valve-actuating-disk mechanism is well provided for, the geared disks being screwed to plates bolted to the crank case. The motion of the eccentrically-mounted pin is truly circular, while the path of the valve sleeve is elliptical, the diameter of the circle described by the pin being 1¼ inches or thereabouts.

There are six ports in the cylinder walls, three for the outlet and three for the exhaust and five in the sleeve valve, the shape of the ports being not unlike the hoof of a horse. One of the ports of the sleeve is a double one and registers with two in the cylinder walls. It is claimed that this motor, 101 millimeters by 130, 4⅜ by 5⅛ inches, gives an actual 50 brake horsepower.

The exhaust opening is larger than the inlet, this being effected by the larger ports and the slope of the central port of

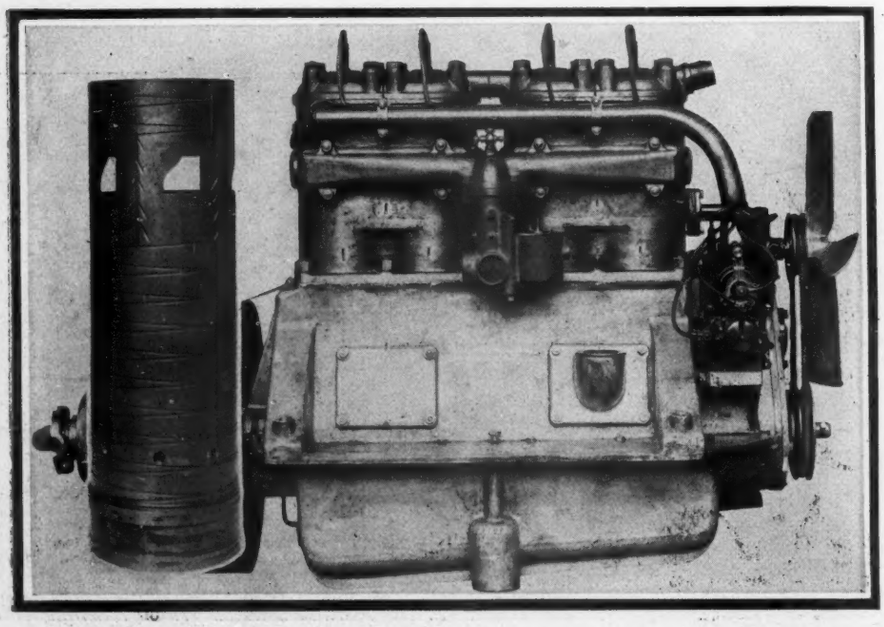

FIG. 7—ARGYLL SLEEVE-VALVE MOTOR WITH ONE OF THE SLEEVES AT LEFT

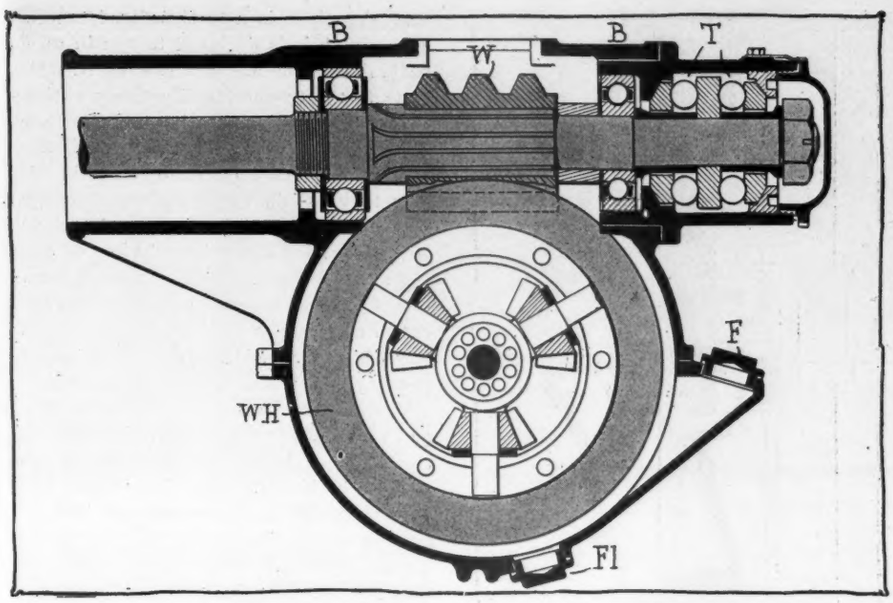

FIG. 8—WORM DRIVE EMPLOYED BY ARGYLL

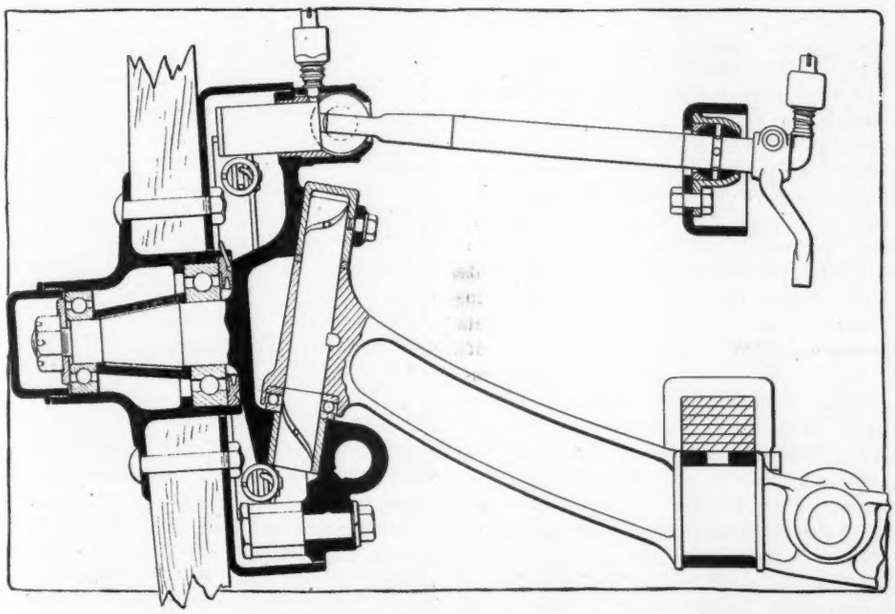

FIG. 9—FRONT WHEEL BRAKES USED ON THE ARGYLL

the sleeve, which has a dual capacity, in as much as it serves both for the inlet and exhaust. Were the central port throughout the length of its base equal in depth to the exhaust ports then there would be an undesirable delay in the closing of the inlet ports.

Front wheel brakes, Fig. 9, are fitted. It will be unnecessary to describe the front wheel brake mechanism at all fully, as a description has appeared in these columns earlier in the year under the title of "Front Wheel Brakes." The coupling up of the brakes is quite a novelty. The brakes on all four wheels are combined and act simultaneously by the operation of the pedal, while the lever locks them, or the brakes may be applied and locked by the lever. The brakes are coupled diagonally, that is, the near side front is coupled to the off side back and vice versa, full compensation being provided to ensure an even application.

Example of Pivotal Steering

An example of pivotal steering is seen here, the axis of the pivot pin when produced touching the road at the point of wheel contact. The strong H section of the axle itself is a noticeable feature rendered necessary by the strains due to the brakes. The axle has centrally a depth of 2¾ inches and a width of 2 inches, the thickness of the webs being approximately $\frac{5}{16}$ inch. The wheel pivots have a diameter of 1⅛ inches and the journal bearings of these pivots are plain ones, having a length each of 1½ inches approximately. A ball-bearing is employed for the thrust. The stub axles have a diameter at their roots of 1¾ inches.

One usually looks for some production both novel and interesting from the Humber. For 1912 no fewer than three new models are being put upon the market, namely, 11 horsepower, 14 horsepower and 20 horsepower. Of these three probably the wider interest will attach to the first mentioned, the 11 horsepower.

Figs. 11 and 13 show respectively a cross section and a longitudinal section of the

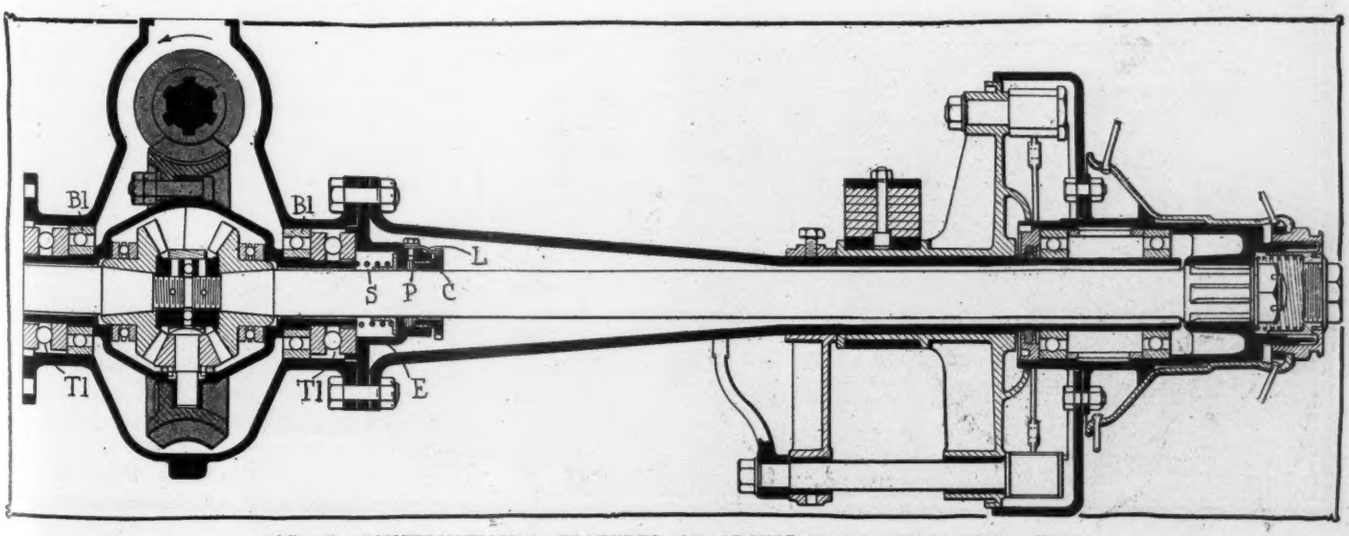

FIG. 10—CONSTRUCTIONAL FEATURES OF ARGYLL WORM-DRIVE REAR AXLE

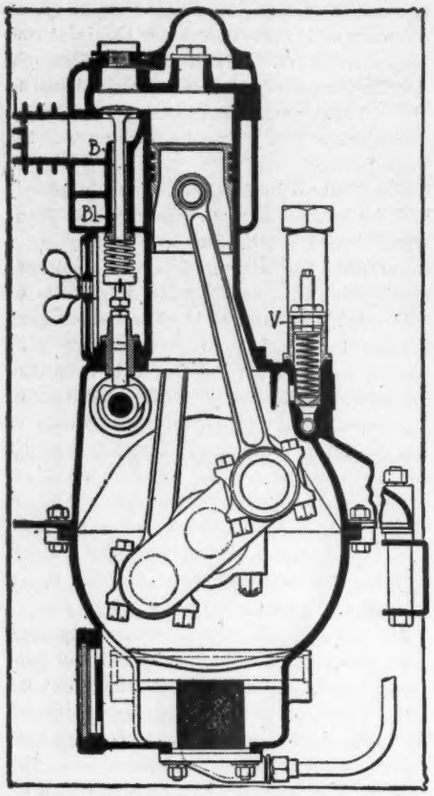

FIG. 11—SECTIONAL END VIEW OF HUMBER ENGINE

11-horsepower engine. The cylinders, which are 2⅝ inches in diameter and have a stroke of 4¾ inches, are cast en bloc and the deSaxe system of construction is in use. The cylinders are placed 13 millimeters off the crankshaft center. The crankshaft has two bearings only; the diameter of these bearings is 40 millimeters, the crankpins having a similar diameter, and the aggregate length of the bearings is 138 millimeters. The exhaust and inlet valves, which are similar, have a diameter of 30 millimeters, and the guides are perhaps a little out of the ordinary in that instead of there being one bushing, either screwed or driven into

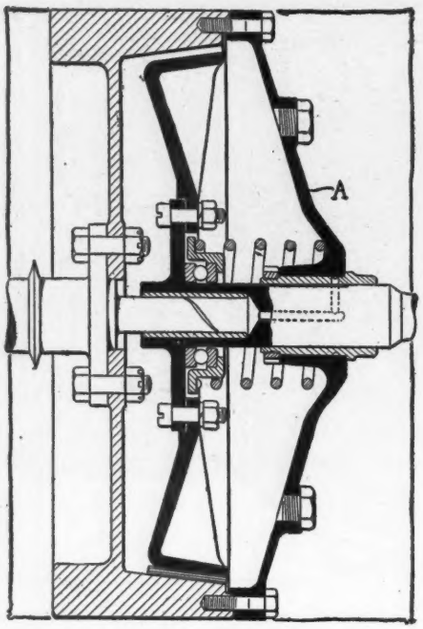

FIG. 12—HUMBER CONE CLUTCH OPERATING IN OIL

place in the crankcase casting, there are two short steel bushes, B and B1, approximately 20 millimeters in length, driven into the top and bottom end of the cast guides. The camshafts and magneto are driven by silent chains and the cams themselves are made in pairs and are pinned to the camshaft. Rollers are not used on the valve tappets, the cams being made of good width, namely, 10 millimeters, to prevent undue wear. The fan bracket serves a double function, namely, that of a water intake E to the thermo-syphon system, as well as a fan bracket. An exhaust carrier cast with the cylinders extends from one end of the casting to the other and has longitudinal ribs upon it to dissipate the heat. An oil pressure relief valve V is situated on the right-hand side of the engine, the by-pass oil returning directly into the crankchamber.

The clutch, shown in Fig. 12, is unique in that though it is a leather-faced external cone clutch it is designed to run in an oil bath, due to the use of a casting A, which bolts to the flywheel and entirely encloses the cone, the thrust bearing and the clutch spring. In this casting are two oil filler plugs. The makers state that in this way they obtain very gentle and gradual engagement of the surfaces in contact and obviously from the point of view of wear the arrangement is ideal. There is a universal joint of sound construction between clutch and gearbox and when de-clutching this whole joint slides upon the castellated primary shaft end of the gearbox.

The gearbox itself is a one-piece casting and provides for three forward speeds, the third speed being driven through the medium of jaw clutches. The wheels have a tooth width of 20 millimeters with exception of the first speed and the reverse wheels, which are 22 millimeters wide. The numbers of teeth in the wheels are as follows: On the upper shaft, starting from the engine end and including the primary wheel, twenty-one, thirty and thirty-eight teeth, respectively, and on the lower or secondary shaft from the forward end, the teeth are thirty-five, twenty-six and eighteen and the wheels in mesh on the reverse have fourteen, twenty and thirty-eight teeth. Ball bearings are used. The arrangement is such that the shafts are short ones, and the distance between bearing centers is in each case only about 8 5/16 inches. A transmission brake of locomotive type is placed behind the gearbox.

Construction of Rear Axle

The back axle is of the bevel type and Timken roller bearings support the driving shaft as well as the axles, though the road wheel bearings are of the usual Hoffman ball type. The crown wheel and pinion teeth have a width on the pitch line of 33 millimeters and their pitch is six. The former has sixty-five teeth and the latter fifteen, so that their ratio is about 1 to 4.3.

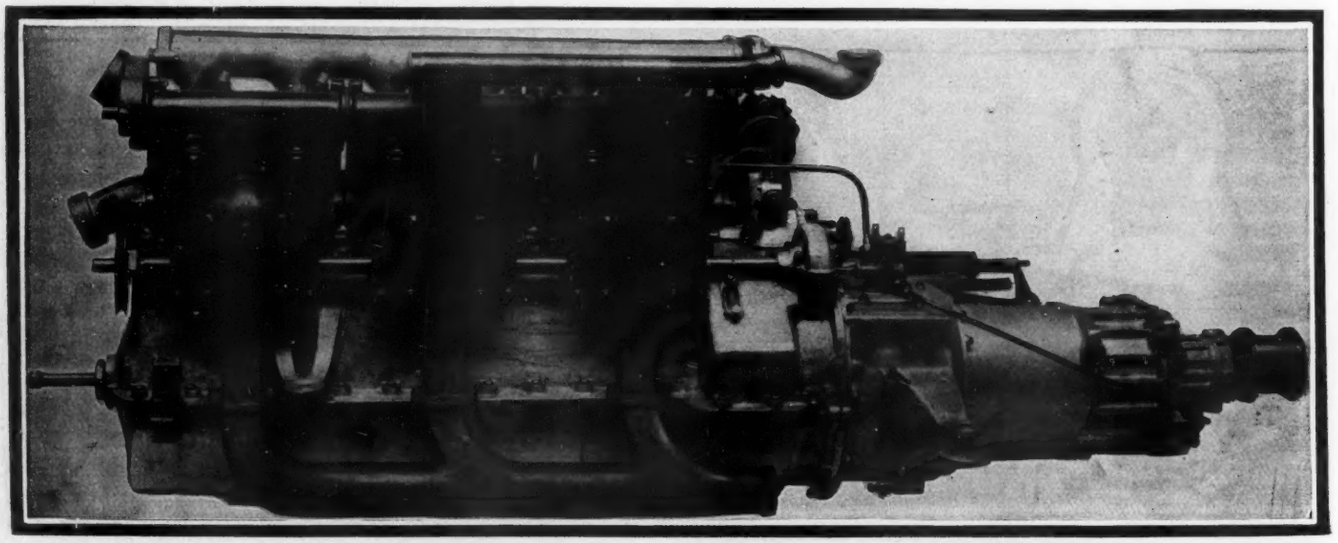

FIG. 14—EXHAUST SIDE OF 38-HORSEPOWER SIX-CYLINDER LANCHESTER MOTOR

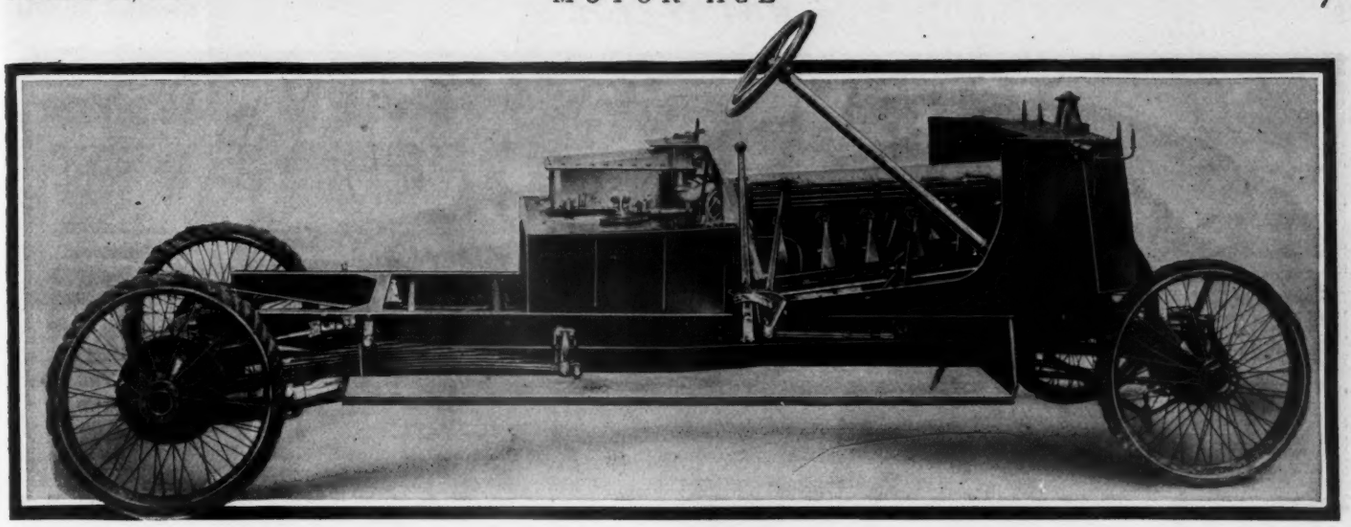

FIG. 15—LANCHESTER SIX WITH MOTOR EXTENDING TO LEFT OF DRIVER

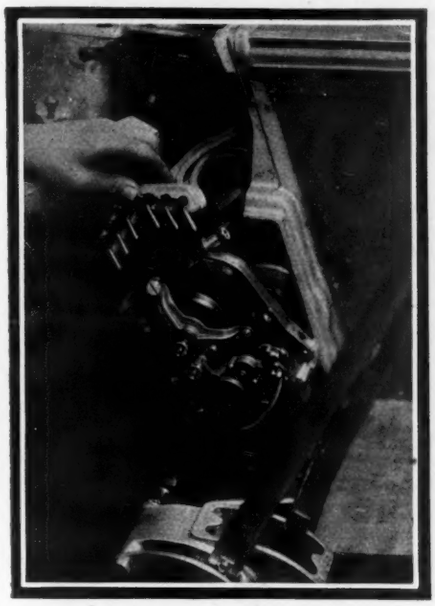

FIG. 16—RUBBER STOCK FOR HOLDING LANCHESTER MAGNETO CABLES

The axles have a diameter of 32 millimeters, the main casting forming the casing has no division in either plane, but the rear part is removable and forms a door for access to the bearing caps; no doubt this construction lends itself to considerable strength. A driving dog is attached by taps and keys to each axle end and these dogs engage in suitable projections on the interior of the hubs. In short, the axle appears to be of great strength and of straightforward and simple design.

The main point of difference between the 11-horsepower and the two larger types, the 14-horsepower and the 20-horsepower, is that the two latter are worm driven. The worm lies beneath its wheel and the shaft passes through a screwed stuffing box for the prevention of oil leakage. The worm shaft is suppo-ted by two heavy ball bearings, having balls ½ inch in diameter and a double ball thrust bearing on the tail end of the shaft takes the thrust of the worm. The driving axles, which are 32 millimeters in diameter, have hexagons milled upon their inner ends to engage with the differential bevels, and the axles can readily be withdrawn when required.

The Lanchester Models

The Lanchester concern, whose construction always has been characterized by the employment of the worm drive and the use of a planetary gearset, is this year making two models, a four-cylinder and a six-cylinder, with both motors having equal bore and stroke. The changes in details are not many, but in many instances the design varies from the more usual European practice. In the six-cylinder power unit, Fig. 14, the cylinders are cast in pairs; the pistons are of steel and horizontal valves are fitted. This is perhaps the only example of an engine built with this form of valve. The valve springs are flat and work practically without noise. The water conduits are cast with the cylinders and water joints are made by means of rubber rings. Another feature is that the exhaust gases pass through a cylinder expansion chamber, thereby becoming cooled and tending to

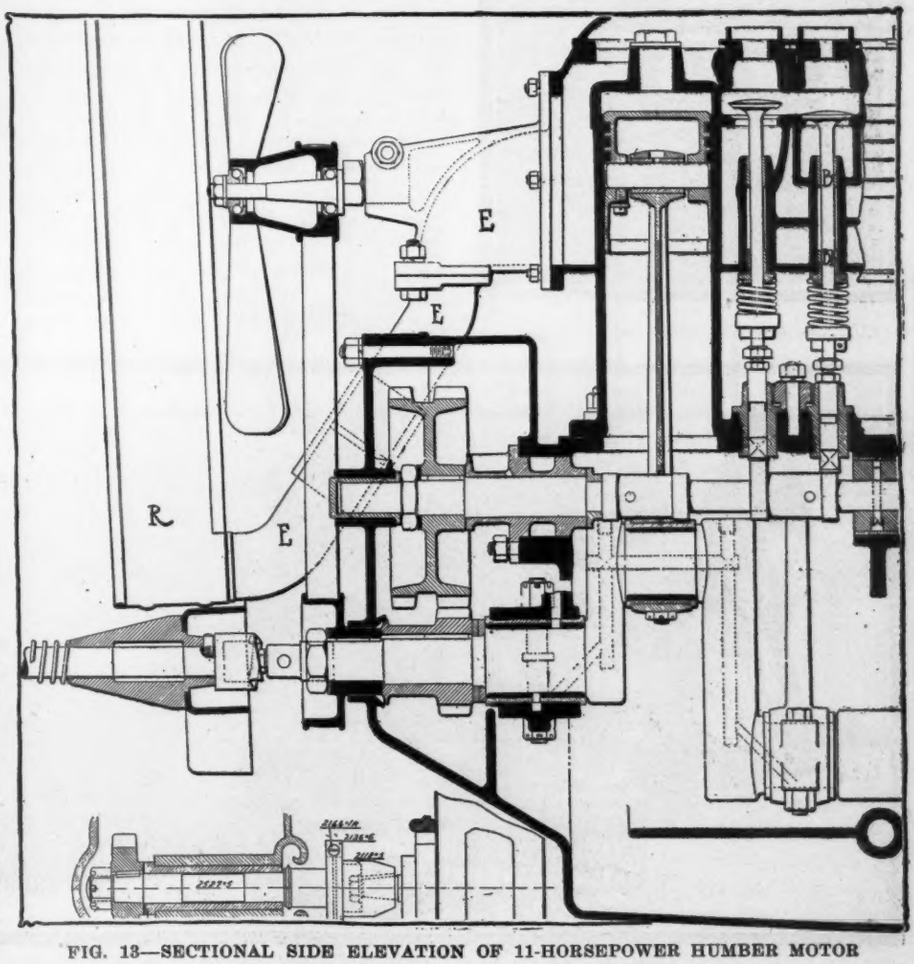

FIG. 13—SECTIONAL SIDE ELEVATION OF 11-HORSEPOWER HUMBER MOTOR

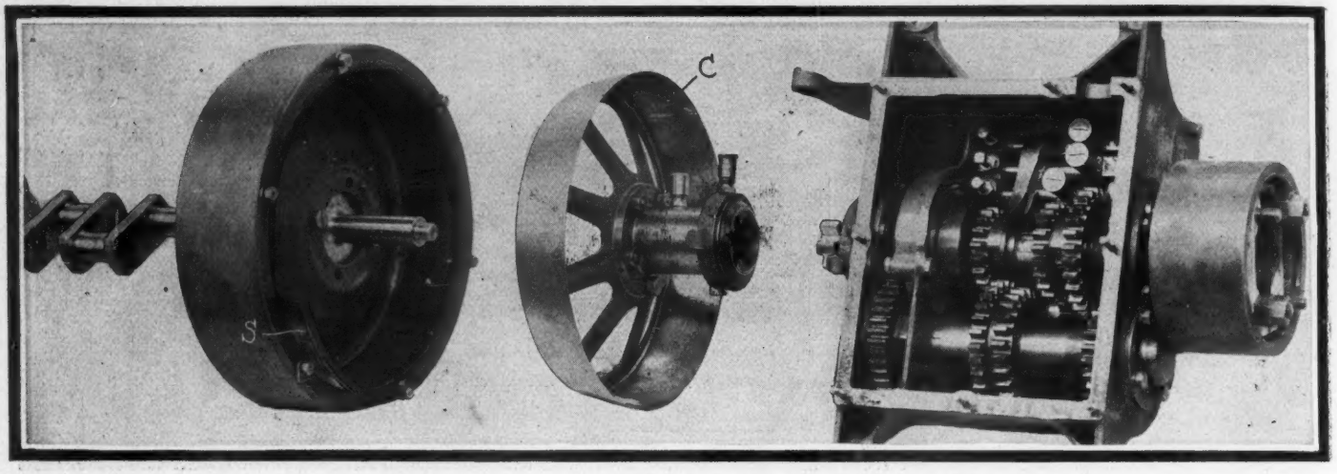

FIG. 18—GEARBOX CLUTCH, FLYWHEEL AND CRANKSHAFT ON AUSTIN CARS

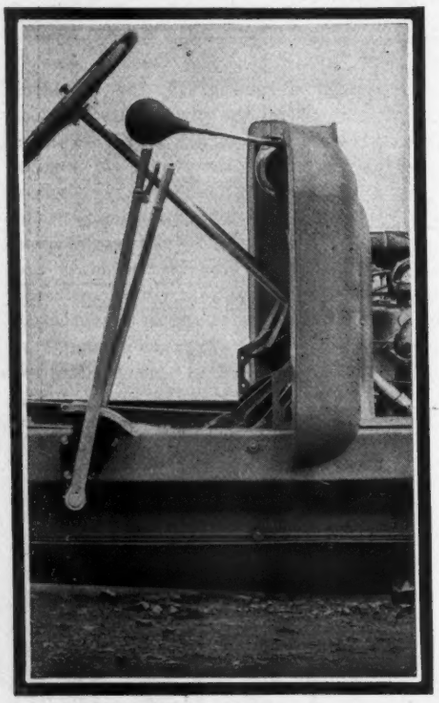

FIG. 19—AUSTIN HORN ATTACHMENT

give a very quiet exhaust. Roller bearings are fitted for the load and balls for the thrust. The control arrangements are entirely different from the usual methods employed; on the left hand of the driver's seat a plate is fixed, from which the regulation of the various controls are manipulated. In place of gauges, knobs are provided, which show whether or not the oil pumps are working in the motor and gearbox.

The vapor regulator of the carbureter is shown, also the throttle lever, which works in conjunction with the pedal accelerator, and the ignition lever. The suspension of the Lanchester cars is one of extreme flexibility, and has been adopted by the Deasy company. An interesting detail is the thick rubber stock, Fig. 16, which carries the magneto terminals in order and position; by means of this stock the whole of the terminals can be disconnected at once without fear of mixing them. In this chassis the driver sits at the right side of the motor, instead of behind it. There is room for a front-seat passenger at the left side of the motor. In this chassis the entire framework hangs between the front and rear axles, so that the utmost ease of riding and car control is obtained. The chassis has a short wheelbase, which makes it convenient for operation on the English roads. This car is of more unique design than any other car in the world.

The Austin cars for 1912 are practically unchanged from the types made for 1911. The arrangement of the leather clutch in this car varies from the usual practice, in as much as the ferrodo facing is riveted on steel segments S, Fig. 18, attached to the inside of the flywheel, whilst the cone C is very light stamping, the idea of course being to have as little flywheel action as possible, therefore facilitating the changing of the gears.

The method of coupling the clutch to the gearbox shaft, shown in this illustration, by means of castellations, is a method of coupling wheels to shafts very largely adopted by British manufacturers. The employment of keys for this purpose is becoming quite obsolete with the best manufacturers.

The gearbox is fitted with seven bearings; the shafts are quite short and the

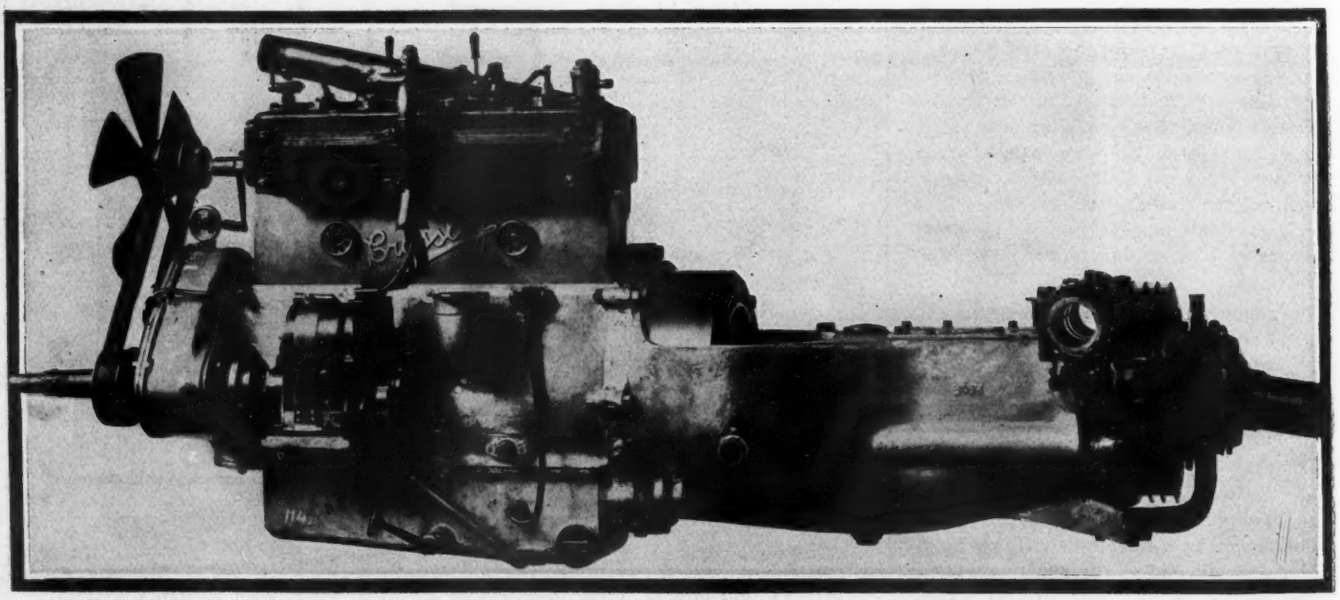

FIG. 20—POWER PLANT OF 15-HORSEPOWER CROSSLEY

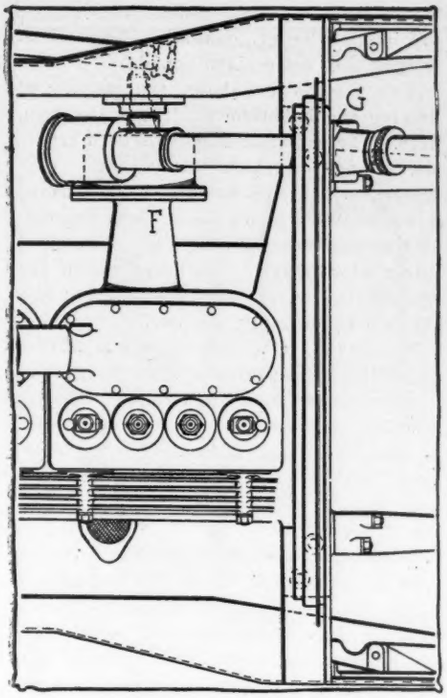

FIG. 21—METHOD OF ATTACHMENT OF CROSSLEY STEERING POST TO ENGINE

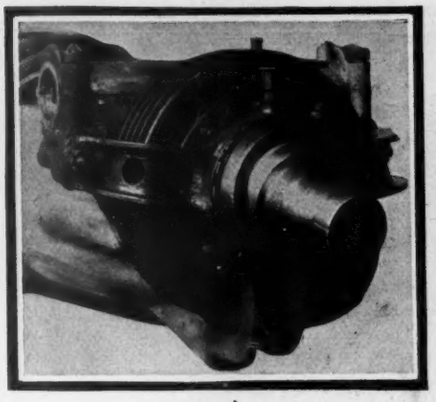

FIG. 24—ENGINE AND GEARBOX ON THE CROSSLEY JOINED BY CRADLE

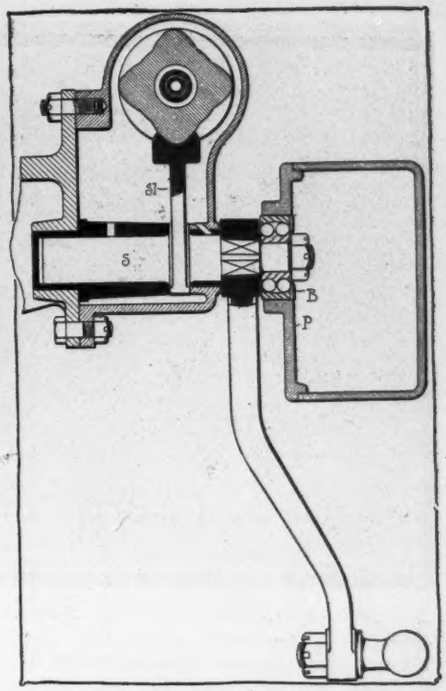

FIG. 22—METHOD OF ADJUSTMENT IN CROSSLEY AXLE BEARINGS

central web of the gearbox tends to further stiffen the whole construction. The fitting of the horn through the curved dash, Fig. 19, is becoming quite a usual feature in connection with many cars.

Self-Starter on Adams

For next year the Adams company is fitting a self-starter. For this purpose an air pump is fitted and the air stored in a reservoir at about 300 pounds per square inch. This air pressure is also utilized by a handy arrangement for inflating the tires, and also a pneumatic jack is provided, which can be coupled up to the air receiver, thereby facilitating the changing of tires, rims or wheels. The rear axle exemplifies the use of Timken roller bearings, the use of which has been considerably increased on this side. The clutch is of the leather-to-metal external cone type.

Features of the Crossley

The 15 and 20-horsepower Crossley cars are good samples of British design. The motor, Fig. 20, of the 15-horsepower is 3⅛ inches by 4¾ inches and the 20-horsepower is 4 inches by 5½ inches. The steering column instead of being attached to the frame in the usual manner by bolts, necessitating weakening of the side members, is fixed direct on the bracket F, Fig. 21, cast integrally with the engine crankcase, and is further stiffened by being secured at the point G to the aluminum dash.

The brake and clutch mechanism form a simple arrangement. At the back of the gearbox is the brake drum J, Fig. 23, provided with cooling ribs, and at the back of the brake drum inside the torque ball K, which is filled with lubricant, runs the universal joint at the top of the propeller shaft.

The drive to the back axle is transmitted down the propeller shaft, running inside the torque tube L. The back axle is further stiffened by means of triangular stays. The brake J is operated by pedal, and further brakes are provided on the rear wheels.

A leather-faced cone clutch is used on both the 15-horsepower and 20-horsepower cars. A ring of specially-treated leather is riveted to the aluminum-tapered cone and by means of the spiral spring is forced against a ring bolted to the flywheel.

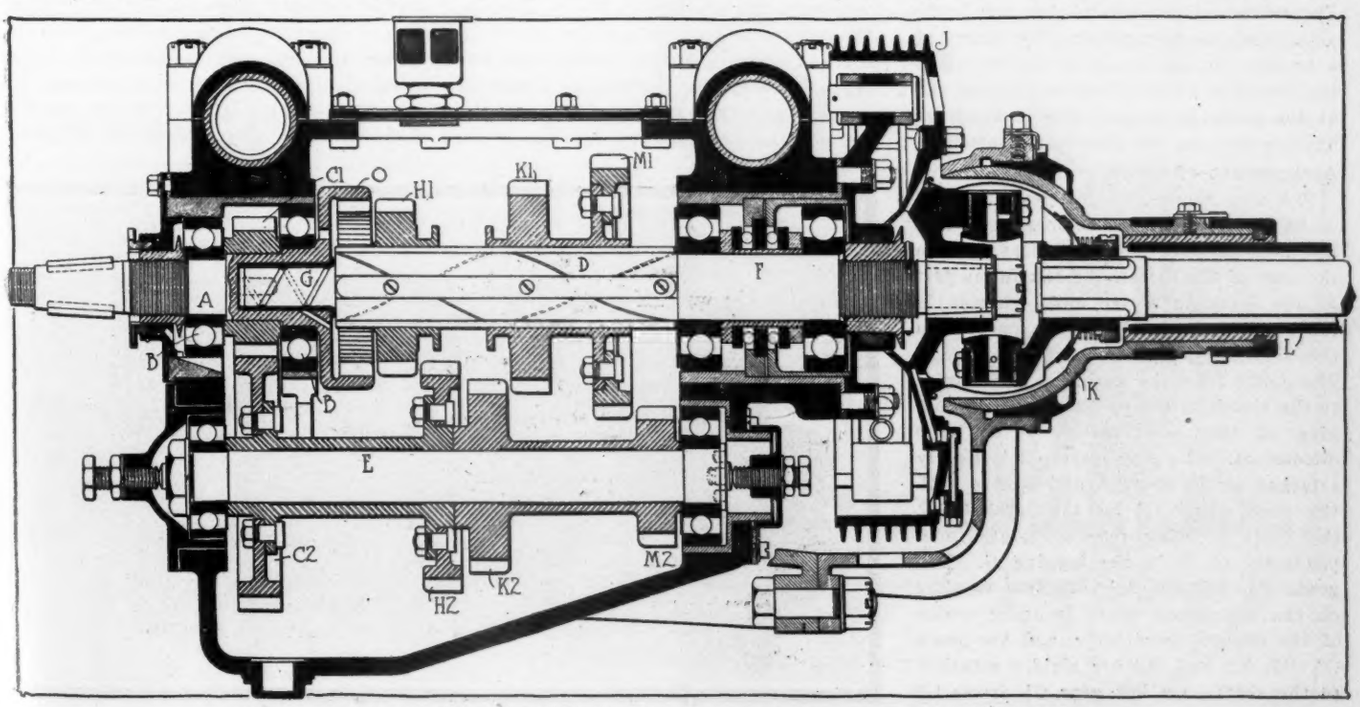

FIG. 23—BRAKE AND CLUTCH MECHANISM EMPLOYED BY THE CROSSLEY MAKERS

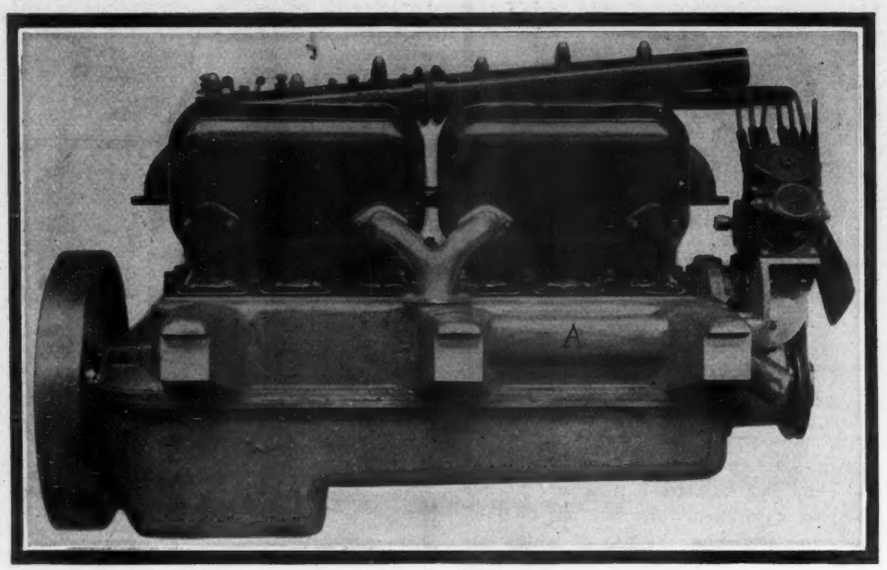

FIG. 25—INTAKE SIDE OF 25-HORSEPOWER SHEFFIELD-SIMPLEX

Being of the internal type no thrust is put upon the crankshaft by the clutch. An adjustable clutch stop is provided to facilitate easy gear-changing.

Bevel drive is adhered to, yet silence of running is obtained by a very simple arrangement. There is an adjustment B, Fig. 22, by means of which, when building the axles it is possible to determine within very fine limits the depth with which the teeth of the gears engage with the teeth of the pinion.

In the 15-horsepower model the engine and gearbox are joined together through the medium of a cradle Fig. 24 which forms a pit in which the flywheel rotates, and in this pit also is situated the clutch and foot brake shaft, also the universal joint between the engine and the gearbox. The entire unit is suspended in the frame on a three-point suspension, by means of a trunnion at the front of the engine in the center of a tubular cross member, and at the back on a long wide bearing on another of the tubular cross members.

Arrangement of Gears

The arrangement of the gears Fig. 23 is the same on both the 15-horsepower and the 20-horsepower models, except that in the case of the former the box forms part of the complete power unit, whereas in the case of the latter it is supported in the frame independently of the engine. The power from the engine is transmitted to the clutch to the primary shaft A running on two ball bearings B of large dimensions. The gear wheel C1 is rigidly attached to the shaft A and meshes with the gear wheel C2 on the layshaft E, the shaft F being free to rotate independently of A in the bearing G. The gears H1, K1 and M1, are free to slide on the castellated shaft D under action of the change speed lever, and the gears C2, H2, K2 and M2 are rigidly attached to the shaft. On low gear C1 drives C2 and M1 meshes with and is driven by M2. On the second speed C1 drives C2 and K1 meshes with and is driven by K2. On the third speed C1 drives C 2 and H1 meshes with and is driven by H2. On top speed H1 is made to slide inside the internal gear wheel O, thus locking the shaft A solid with the shaft D, and the drive is therefore transmitted through the gearbox direct to universal joint. All the gearbox shafts are very stiff and run on ball bearings of large dimensions and consequently are remarkably silent and efficient.

Sheffield-Simplex Design

There practically is no alteration in the 45-horsepower six-cylinder Sheffield-Simplex, but considerable interest is being shown in the 25-horsepower six-cylinder chassis, Fig. 25. The bore of the cylinders is 3½-inch with 5-inch stroke. The cylinders are cast in two sets of three and the waterways are abnormally large. The intake waterpipe is cased in the crankcase at A. The crankshaft is hollow and has seven journals 2¾ inches in diameter, ranging in length from 6 inches at the flywheel end to 2 inches for the intermediate cylinder journals. The shaft weighs only some sixty pounds.

This illustration shows the method of driving the half-time shaft and the magneto. The castellated ends of both crankshaft and camshaft carry skew gear wheels, which are coupled by means of a worm placed at an angle of 45 degrees; this arrangement of course gives an absolutely silent drive. The lower end of the wormshaft drives the wheel oil pump through an ordinary jaw dog.

The camshaft is carried in an isolated and oil-tight compartment, oil being filled in this compartment from time to time as occasion requires. A novel arrangement is that of fitting a brake on the camshaft, with a view to steadying the load and to nullify the back kick due to the lap of the valves.

With regard to lubrication, oil is drawn from a pump below the engine casing and fed to the main crankshaft bearings and to troughs on the connecting rods. The oil pressure is normally 4 pounds per square inch. A feature in connection with the oiling arrangement is that the oil filler cap cannot be replaced after the replenishing until the oil lever proving cock is closed, so avoiding any possibility of loss of oil through misadventure.

There is no water pump, cooling water circulating by thermal displacement. Both the crankshaft and the camshaft are fitted with ball thrusts at each end. The drive is transmitted from the engine through a multiple-disk clutch that has sixty-one alternate phosphor-bronze and steel flat plates. The thrust pressure is 200 pounds and is maintained by a central spring provided with external adjustment. The plates are lubricated by flake graphite.

The three-speed gearbox Fig. 29 is bolted to the forward face of the differential case. There are two indirect forward speeds and one direct, the direct speed being obtained by internally meshing the second indirect gear pinion on the primary shaft with the sleeve pinion at the rear

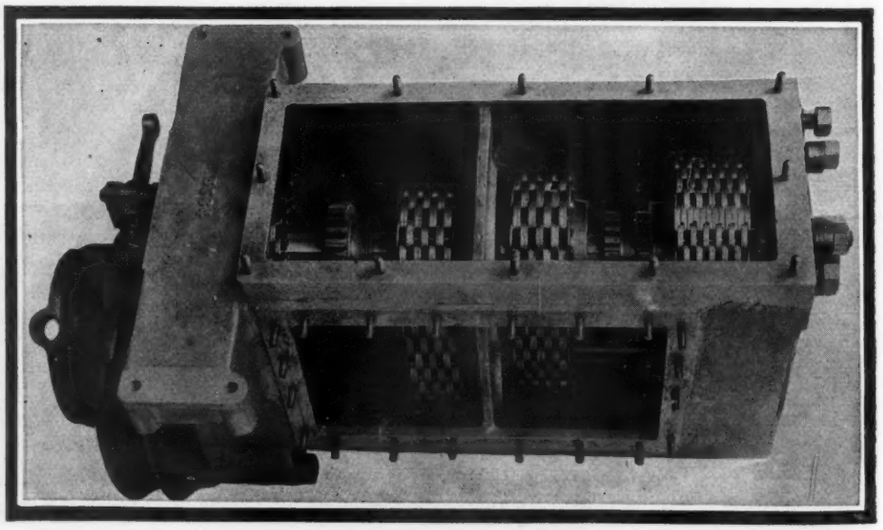

FIG. 26—MAUDSLEY CHAIN GEARBOX

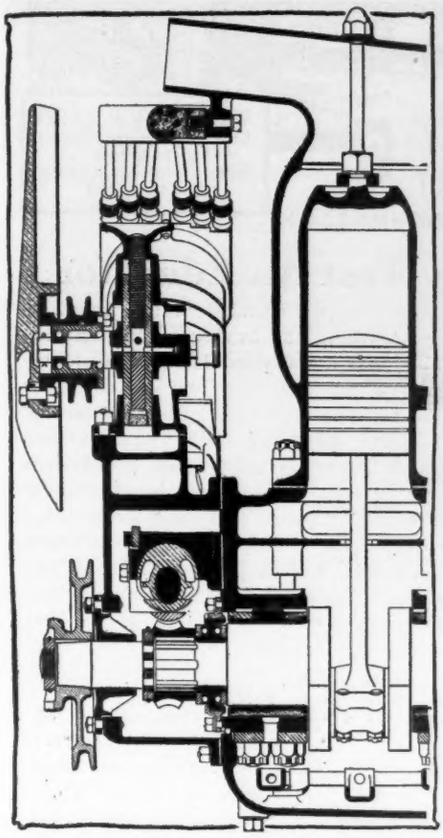

FIG. 28—MAGNETO AND CYLINDER CONSTRUCTION OF SHEFFIELD-SIMPLEX ENGINE

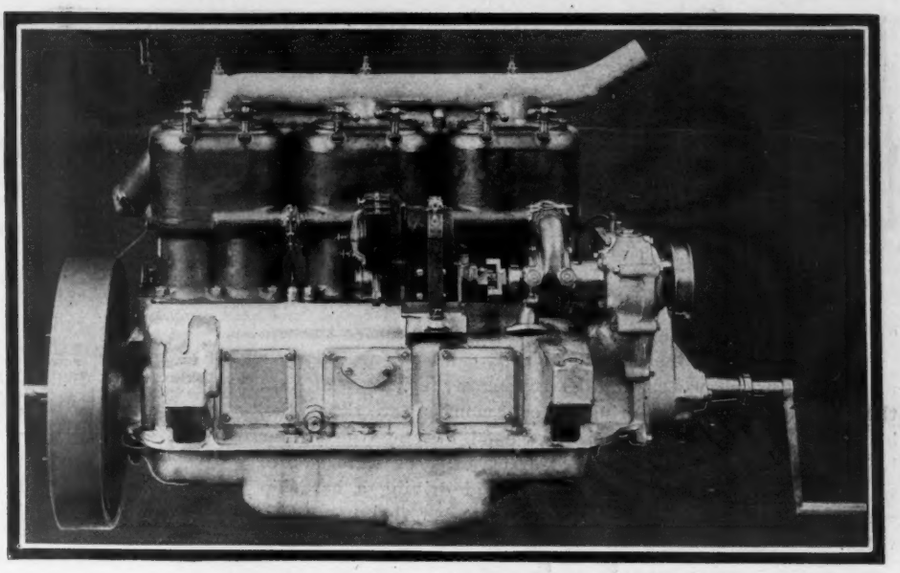

FIG. 27—SIX-CYLINDER MOTOR OF 1912 WOLSELEY

of the box. A double thrust bearing is used in front of the bevel pinion and the pinion has an annular bearing in rear of it. Thrust bearings are used at each side of the differential.

Rotating the Road Wheels

The method of rotating the road wheels is clearly shown. By the method adopted the arching of the rear axle casing with the corresponding splaying of the road wheels is provided for. The driving axles have knurled ends where they connect with the differential gear, which not only allows for the splaying of the wheel, but also permits the axles to be withdrawn through the sleeves and road wheel hubs. Each rear wheel is carried on two races of annular ball bearings and between them is a double thrust bearing. It is questionable if in any other British car the thrust problem is given the attention it is in this model.

Referring to the drawing of the front hub, Fig. 29, it will be seen that the angle of the road wheel's inclination is arranged so that the base of the axis intersects the axis of the steering pivot. This drawing also shows the compound ball load and thrust bearings.

There are very few radical changes in the Wolseley models for 1912, the principal one being the substitution of silent chains in place of gears for camshaft drive. All engines are now being fitted with covered tappets and valve spindles, for although it is generally admitted that the caging of these parts make but little difference in the case of a new engine when no wear has taken place, yet by excluding dust wear is prevented or much delayed, and hence silence is maintained. Timken bearings are to be more in evidence on the Wolseley cars than has been the case in the past. Considerable interest attaches, however, to the six-cylinder type of engine, Fig. 27, and the 50-horsepower engine turned out by the Wolseley company is beyond doubt a good example of such an engine. The bore of the cylinders is 4½ inches and the stroke 5¾ inches. The crankshaft, which has a diameter of 2⅛ inches, has four bearings, the bearing at the flywheel end being 4¼ inches long and the others, respectively, to the forward end being 3⅜ inches, 3⅜ inches and 5 inches long. Central webs connecting the respective crank pins are of very heavy design, and have a width of no less than 1⅞ inches. The crank pins have a diameter of 2¼ inches and a length of 2½ inches. The crankshaft is an exceedingly heavy and stiff one throughout, so that the above dimensions will be of interest. The piston tops are not only coniform but are ribbed on their under sides as well. Troughs are employed for lubrication.

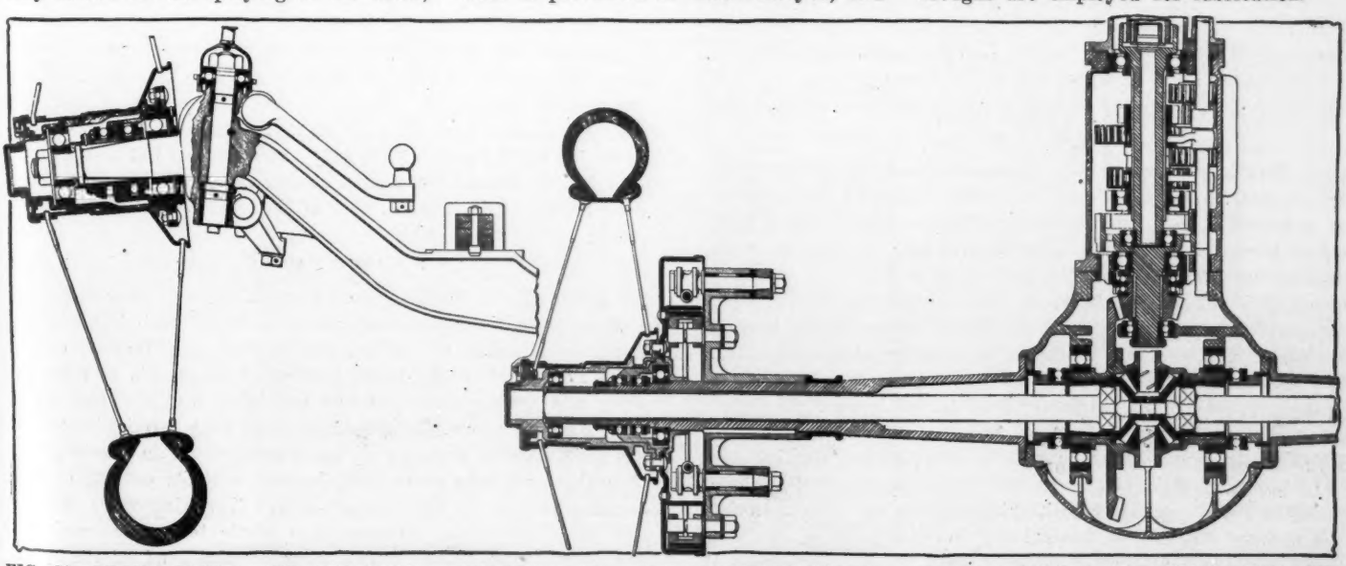

FIG. 29—FRONT WHEEL AND STEERING CONNECTION OF THE SHEFFIELD-SIMPLEX. FIG. 30, GEARSET AND REAR AXLE CONSTRUCTION ON SHEFFIELD-SIMPLEX

MOTOR AGE
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Winter Car-Body Styles

TIME was when with the first appearance of winter the motorist went into hibernation and his car was carefully put away until warm weather. The few hardy spirits who kept their cars in commission during the cold months were those who, before the advent of the motor, enjoyed braving the winter blasts in open sleighs. But the great majority of motorists, to whom comfort is a prime requisite, found driving a hardship with the open cars and flimsy storm curtains that were provided.

WITHIN the last few years, however, car makers have turned their attention in a practical way to the question of providing a conveyance that is serviceable all the year round. Their efforts have been most successful in the line of inclosed bodies. These have taken the form of coupe, limousine, landaulet and similar types of superstructure under various names. Probably the type that has met the widest demand for the average motorist is the coupe body, designed to replace or supplement the roadster or touring body which is employed during what is known as the touring season. These coupe bodies have met with an especially hearty reception from one class of motorists in particular, the city business men who are accustomed to drive to and from their offices and who welcome the opportunity to continue the practice throughout the year.

SOMETIMES the winter equipment consists of an entire special body, the regular body being removed and the inclosed one substituted for it on the chassis. In other designs, the regular body is converted into the inclosed form by replacing the top with paneled sides and roof. This method is much in vogue with two-seated cars, and has been made easier by the increased use of fore-doors. With the larger types of enclosed bodies, the latter method is not so feasible, the usual procedure with these being the replacement of the entire body. With the complete inclosure of the interior, it is made wind-proof and the motorist need have little fear of cold. In the case of the landalet and limousine bodies, there is an increasing tendency to provide the same comforts for the driver as are enjoyed by the passengers. This tendency has taken the form most often of the vestibuled body, in which the driver's seat is in an inclosed compartment separate from that occupied by those in the rear.

BY far the greatest number of manufacturers have contented themselves with utilizing the bodily heat of the occupants as a means of keeping the interior warm. Efforts have been made, however, to provide additional means of heating, with varying success. Some of these have taken the form of registers by which hot air is delivered from around the exhaust pipe, others of radiators through which the hot water of the cooling system is led, and still another type employs electric heaters. One feature that has not received the consideration it deserves is the provision of an efficient means of ventilation.

WITH the means that have been provided for starting the motor, lighting the lamps, and regulating the fuel mixture from the seat, in addition to keeping out the cold, the motorist can operate his car as comfortably in winter as in summer. There is needed only better roads to make the touring season a continuous one.

Reliability Test An Educator

WHEN reliability runs first were conceived the promoters only had in mind teaching the buying public that the motor car was dependable, that it was possible to make country trips and that it could cover much more ground in a day than the horse. Later, as the car was improved, largely by the lessons taught by these contests, the object of the reliability was to demonstrate the infallibility of the motor, that it could run day in and day out, over all sorts of roads, and in all kinds of weather, with only occasional mishaps and those only minor ones. Then came the day of the technical examination which so often proved to the public that in point of stamina and endurance the modern motor really is superior to the locomotive, which has to have its steel rails to run upon and to have careful attention every few hundreds of miles.

NOW it would seem as if that stage has been passed and that the reliability run of the present day has other ramifications. The public knows the car's dependability and therefore the reliability run as it is now is more in the nature of a good roads missionary, awakening the people to the need of better highways and showing them that if the country was a network of fine roads that motoring would be far more enjoyable. Then, too, the modern reliability arouses city folks from their lethargy, makes them see there is more to motoring than driving on the boulevards—enthuses them, in fact, to the joys of getting out into the country.

EXAMPLES of this were seen in the recent Glidden and the Chicago reliability. From New York to Jacksonville, Fla., a good roads wave swept and no one can question the good the national tour did for the people of the south. The Chicago reliability was somewhat different. It has aroused the people of the middle west to the fact that in their own section there are scenery and roads that cannot be beaten in the touring fastnesses of the east, and next summer the middle west is bound to profit thereby. There will be no more stay-at-homes and the tourists will swing through Illinois, Indiana, Kentucky, Ohio and Michigan and enjoy themselves. The hotelkeepers in the big cities along the route will see the motoring light and will bestir themselves to give the motorists better accommodations. Garages in the smaller towns will also reap a benefit and the middle west will come into its own. All it takes is a little co-operation on the part of not only the motorists but also others who benefit financially from the exodus of the tourists from their home cities. A scenic tour of the west is a possibility that should not be overlooked.

IT takes only a little to start the enthusiasm. For instance, since the Chicago reliability the Louisville club has written Governor Marshall of Indiana asking that the Hoosiers co-operate and improve the route between Indianapolis and Louisville, and giving credit to the reliability run for the idea. That's only a straw. If the simple fact that a reliability tour has succeeded in arousing so much enthusiasm in one section, then there must be some good in such contests outside of the benefits derived by the winner in an advertising way. Therefore, it is up to the industry as a whole to support such an event—not from selfish motives but for the good of the sport as well as the industry. Every one should co-operate.

Chicago Tackles the Used-Car Problem

CHICAGO, Nov. 13—Having successfully promoted a fall show, the Chicago Automobile Trade Association has tackled the second-hand car proposition. It has worked on this problem for a month and today, at a general meeting of the association, the report of the special committee as approved by the directors, was read and adopted.

The Chicago idea is different from those in vogue in other cities in that it does not attempt to bind the dealers by iron-clad contracts—it simply furnishes a source of information which will be of value to the tradesmen in setting prices on old cars offered as part payment on new ones. The scheme as outlined is as follows:

First—There shall be established a bureau of information to be conducted under the direction of the directors of the association.

Second—The association shall have prepared blank forms arranged to receive a list of all models made by any one manufacturer for the year 1908, and each subsequent year, including model, number of passengers, type of motor, selling price when new, allowance price for each model in average condition, and resale price when thoroughly overhauled.

Third—These blank forms shall be distributed to all dealers, and each dealer shall file such forms, properly filled out, giving the above information, with the secretary of the association.

Fourth—Thereafter on the first of every month each dealer shall file with the secretary a revised card showing any changes in prices or models.

Fifth—The association shall have copies of each report or revised report printed in quantity sufficient to furnish one or more to each member of the association; suitable loose leaf binder covers shall also be obtained, marked on the outside with the name of the association, in which a copy of each report shall be placed alphabetically arranged; a copy of these reports so bound shall be furnished by the association to each of its members.

Sixth—The association shall furnish each member with a printed copy of each revised report thereafter filed with it by any dealer; and for this purpose the association shall employ a messenger whose duty it shall be to deliver these revised reports to each member, personally placing the new sheets in each binder, and returning the old sheets to the secretary of the association.

Seventh—These binders shall be the property of the association at all times, and shall be renewed by it whenever necessary.

Eighth—A committee of three members of the association shall be appointed by the president each year immediately after the election of officers.

Ninth—It shall be the duty of this committee, whenever any member fails to file the reports provided for by these rules, to obtain, by any means that it may consider appropriate, sufficient information to enable it to prepare and file with the secretary a report similar to a dealer's report, which shall be received in lieu of the report of the particular dealer.

Tenth—Whenever any member shall sell a second-hand car, such member shall immediately report by mail to the association, filling for that purpose a blank form, to be furnished by the association, which shall read as follows: "I, today sold.....second-hand car model ....., number of passengers....., price when new....., for $..... Signed ....., dated....."

Eleventh—The association shall have compiled weekly a list of all sales of second-hand cars reported each week, giving make, model and price, and a printed copy of this list shall be mailed to each member; the names of the dealers selling the cars shall not be made public, but kept on file by the association for its records.

Twelfth—The association shall also obtain information from all possible sources to enable it to print weekly a list of the number of the various models and makes of second-hand cars on sale in the hands of members. A copy of such lists shall be mailed to each member.

Thirteenth—Each member of the association shall render all possible assistance to the association in obtaining this information and shall furnish it with complete lists of all cars on hand for sale.

Fourteenth—Each member after completing a trade for any second-hand car shall immediately report by mail to the association, filling in a blank form, to be furnished by the association, which shall read as follows: "I, today, took a second-hand car, model....., allowing $..... as part payment on a new car. Signed....., dated....."

Fifteenth—Each member shall make all quotations on second-hand cars to its customers in writing, and shall mail a copy of such quotation, omitting the name of the customer, to the association upon forms to be supplied by the association.

Sixteenth—The association, through its secretary, shall furnish to any of its members, on request, the amount that any dealer has allowed for any second-hand car or any quotation made by any dealer to a prospective customer on any second-hand car, using for this purpose the information obtained from the reports provided for in clauses 14 and 15.

Seventeenth—The expense of obtaining and furnishing the information provided for in the preceding clauses 1-15, shall be divided pro rata among the members of the association, dealers in motor cars.

AKRON'S MANUFACTURING SHOWING

Akron, O., Nov. 14—In giving Akron credit for an increase of 118 per cent in the value of its manufactured products for the years 1904-1909, the United States census bureau's recent report paid tribute to the development of the motor industry, for tires are the basis of practically all the Akron growth in the time covered. Growth in the years 1910-1911, while not covered by the report, has been more remarkable than that in the period mentioned. In the past 2 years every tire-manufacturing rubber concern in this city has actually doubled, and in some instances even tripled its capacity.

The percentages of growth for Akron as outlined in the report of the census, division of manufactures, are as follows: Salaried officers and clerks, 219 per cent; value added by manufacturers, 129 per cent; value of products, 118 per cent; cost of materials used, 11 per cent; capital invested, 103 per cent; salaries and wages, 99 per cent; average number of wage earners, 64 per cent; number of establishments, 32 per cent.

November 20-24—First American road congress at Richmond, Va., under auspices of American Association for Highway Improvement.
November 20-25—Fall show at Indianapolis.
November 22—Road users day, American Road Congress, Richmond, Va., under direction of Touring Club of America.
November 22—Start of 11-day around-Georgia tour.
***November 27—Vanderbilt road race, Savannah, Ga.**
November 30—Grand Prix race, Savannah, Ga.
December 30-January 6—Show of Buffalo Automobile Trade Association, Buffalo, N. Y.
January 6-13—Twelfth annual show, pleasure car division, Automobile Board of Trade, Madison Square garden, New York.
January 6-20—Madison Square Garden show, New York City, Automobile Board of Trade.
January 10-17—Annual show, Motor and Accessories Manufacturers, Madison Square garden, New York.
January 10-17—Annual show, National Association of Automobile Manufacturers, Grand Central palace, New York.
January 13-19—Milwaukee show.
January 13-27—Show of Philadelphia Automobile Trade Association.
January 15-20—Twelfth annual show, commercial division, Automobile Board of Trade, Madison Square garden, New York.
January 18-20—Annual meeting Society of Automobile Engineers, New York.
January 22-27—Show at Providence, R. I.
January 22-27—Show at Detroit, Mich.
January 27-February 10—Eleventh annual show under the auspices of the National Association of Automobile Manufacturers, Coliseum, Chicago.
February 5-10—Annual show, Pleasure Car Exhibit, St. Louis.
February 5-17—Show at St. Louis.
February 12-17—Annual show, Commercial Car Exhibit, St. Louis.
February 12-17—Show at Kansas City, Mo.
February 14-17—Show at Grand Rapids, Mich.
February 17-24—Show at Newark, N. J.
February 17-24—Minneapolis show.
February 19-24—Show at Hartford, Conn.
February 19-24—Seventh annual show of Omaha Automobile Association, Omaha, Neb.
February 26-March 2—Second annual show of Elmira Automobile Club, Elmira, N. Y.
March 2-9—Pleasure car show, Boston.
March 4-9—Show at Denver, Colo.
March 13-20—Show of Boston Commercial Motor Vehicle Dealers' Association, Mechanics' building, Boston.

* Sanctioned

STEARNS BUYS ROYAL PLANT

Cleveland, O., Nov. 14—A deal was closed in Cleveland last week whereby the F. B. Stearns Co. of this city secured control of the Royal Tourist Motor Car Co.'s factory. The Royal factory is one of the most complete plants of its kind in the country. It is situated directly on the tracks of the Lake Shore and Michigan Southern Railroad, and is but 10 minutes' run from the main Stearns factory. The Royal shops are being operated as the Stearns plant No. 3. The Stearns company has moved its body-building, upholstering, painting, road-testing, final-assembly and finished-test departments to the Royal plant, thus giving much more room in the main factory on Euclid avenue. The departments installed in the Royal factory are keeping practically the entire plant busy, all the work being done, of course, by Stearns employes.

The Stearns factory at the corner of Euclid and Lakeview avenue continues in full operation, its entire facilities being concentrated on the manufacture of the chassis only. As fast as completed, chassis are run under their own power to the Royal factory, where they are tested out and the complete cars finished. Shipments are made from the Royal plant.

Despite the acquisition of the Royal factory, which is being operated as Stearns plant No. 3, the new Stearns factory building at Euclid and Lakeview avenues is being pushed to completion as rapidly as possible. It is expected that the building will be ready for occupancy early in January. It will be devoted entirely to machining operations. It is expected that, with the help of this new building and the additional facilities offered by the Royal plant, the Stearns output this year will be increased over last close to 100 per cent. The entire factory organization is being concentrated on the one model—the Stearns-Knight.

Now Savannah's Turn in Limelight

Practice Begins for Road-Racing Carnival in Georgian Metropolis—Benz and Case Teams Among First to Report—Prize of $1,000 Offered if American Car Wins Grand Prix

GRAND PRIZE RACE

Car	Driver
Benz	Victor Hemery
Benz	Robert Burman
Benz	Eddie Hearne
Fiat	David Bruce-Brown
Fiat	Louis Wagner
Fiat	Caleb Bragg
Abbott-Detroit 44	L. A. Mitchell
Abbott-Detroit 44	Carl Limberg
Lozier	Ralph Mulford
*Marmon	Joe Dawson
*Marmon	Cyrus Patschke
*Mercedes	Ralph de Palma
*Pope Hummer	Louis Disbrow
*Buick	Charlie Basle
*Apperson	

VANDERBILT CUP

Fiat	David Bruce-Brown
Fiat	E. H. Parker
Fiat	Joe Matson
Lozier	Ralph Mulford
Lozier	Harry Grant
Abbott-Detroit 44	Carl Limberg
Abbott-Detroit 44	L. A. Mitchell
Mercer	Hugh Hughes
Jackson	Harry H. Cobe
*Marmon	Joe Dawson
*Marmon	Joe Nikrent
*Apperson	

SAVANNAH CHALLENGE

Case	Jay McNay
Case	Billy Knipper
Mercer	W. F. Barnes, Jr.
Mercer	
Mercer	

TIEDEMAN TROPHY

E-M-F	Tack Tower
E-M-F	Frand Witte
E-M-F	Robert Evans
Abbott-Detroit	F. L. Hartman
Abbott-Detroit	M. Roberts

*Promised

SAVANNAH, GA., Nov. 13.—The grand prize race course was turned over today to the speed kings already here for practice for the 1911 races. The Fiat teams which arrived here on Tuesday are now quartered at Doyle track at Thunderbolt, where they were last year. Bruce-Brown, Bragg and Parker are in the city and Wagner is expected in a few days. News was received by President Granger that Teddy Tetzlaff was injured last week in the desert road race and could not drive, so Joe Matson will replace him. Matson gets here Tuesday.

The Case cars arrived from Columbia on Wednesday and are at Barbee's, at Isle-of-Hope. The car in which Joe Jagerberger was injured at Columbia has been repaired. Billy Knipper probably will drive it.

The entry list was increased last week by three entries of E-M-F cars in the Tiedeman trophy race, three Mercers in the Savannah challenge trophy and six Abbott-Detroits, two in the Tiedeman trophy, two in the Vanderbilt and two in the grand prize.

Jay McNay, who is to drive the second Case car in the Tiedeman trophy, tried out part of the course on Friday and showed a speed of 85 miles an hour. Bruce-Brown traveled over the course and pronounced it at least 5 miles faster than last year. However, he does not favor the banking of the turns, which has been done this year to get greater speed out of the cars.

A prominent citizen of this city has offered $1,000 to the American car winning the grand prize race this year. Last year this prize was given by the same person for the first American car finishing, but this year he made it a little harder, giving it for the American winning the race.

FLANDERS BREAKS CLASS RECORDS

Indianapolis, Ind., Nov. 14—For the first time since the speedway was built a manufacturer has used it for record trials with officials of the A. A. A. supervising the attacks on Father Time. These trials took place today when two Flanders 20-horsepower cars were sent after record in the 160 and under class, both class B and class C. The marks established were as follows:

Class B, Witte driving—1 mile, :56.80; 2½, 2:24.07; 5, 4:45.42; 7½, 7:06.22; 10, 9:27.49; 12½, 11:50.12; 15, 14:13.26; 17½, 16:37.51; 20, 19:00.87.

Class B, Witte driving, for 5-mile record—1 mile, :57.63; 2½, 2:20.38; 5, 4:22.98.

Class C, Evans driving—1 mile, :56.80; 2½, 2:20.46; 5, 4:42.17; 7½, 7:03.79; 10, 9:23.87.

Class C, Evans driving, for 20-mile record—2½ miles, 2:13.36; 5, 4:26.07; 7½, 6:38.92; 10, 8:53.97; 12½, 11:09.53; 15, 13:24.00; 17½, 15:39.17; 20, 17:54.82.

The trials were run under the observance of C. A. Sedwick, A. A. A. representative, and F. E. Edwards, chairman of the technical committee of the A. A. A. The Warner timing apparatus was used. The national body now will be asked to accept the records as class marks.

HUDSON FUEL TEST WINNER

Harrisburg, Pa., Nov. 15—The annual economy run of the Motor Club of Harrisburg, held on Monday, proved a sweeping victory for the 1912 Hudson touring car which carried off the sweepstakes trophy for dealers against the field of seventeen cars. A 1912 Cadillac finished in second place, while the private owners' trophy went to a 1911 Cadillac driven by W. P. Starkey.

The event proved one of endurance for the contestants as well as the cars. With the thermometer hovering near zero the contesting cars were sent away over a 105-mile course and when the noon control at York, 60 miles away, was reached, everyone was so chilled that an hour and a half was allowed for lunch.

Two of the seventeen starters had to withdraw, the Reo of G. G. McFarland skidding into a side ditch and breaking the rear axle about 50 miles out, while the Klinekar driven by J. A. Kline broke a water lead on cylinder just outside of York. The chairman's car, in charge of J. Clyde Myton, also had a number of mishaps, while punctures were many on the frozen roads.

The contest was to determine the cost per passenger per mile for gasoline consumption and the cars reporting in the morning were thoroughly drained, filled to their capacity and sealed. At the end of the run the gasoline tanks again were filled to determine how much had been used on the run. The Hudson, driven by Roy Hamilton, showed a consumption of 5 gallons and ⅛ pint for the trip at a cost of $.8025 for five passengers. Another Hudson toy tonneau competing as a runabout, used 5 gallons 2 quarts 1 pint but its standing was lower on account of carrying only two passengers. The five Cadillacs entered made a splendid showing and easily carried off team honors. The Inter-State also showed well for heavy load and secured third place in class C.

In addition to the two trophies certificates of merit were given to the cars finishing first, second and third in each class. The cars were classed according to list price, there being classes for touring cars and runabouts. The route led over exceptionally hilly roads and a great proportion of the way was over frozen dirt roads with many sharp turns. Summary:

CLASS A—TOURING CARS, $1,000 AND UNDER

Position No.	Car	Entrant	Cost per mile per passenger
9	Flanders	E. L. Craft	.0212
CLASS B—TOURING CARS, $1,000 TO $1,500			
19	Everitt	G. C. Furl	.00233
8	E-M-F	E. L. Craft	.00242
*18	Reo	G. G. McFarland	
CLASS C—TOURING CARS, ABOVE $1,501			
5	Hudson	I. W. Dill	.00154
14	Cadillac	C. C. Grispen	.00167
6	Inter-State	I. W. Dill	.00175
17	Cadillac	C. C. Crispen	.00188
15	Cadillac	P. Starkey	.00191
3	Chalmers	R. L. Morton	.00195
†13	Cadillac	H. D. Delmotte	.00222
7	Chalmers	J. Gallagher	.00235
2	Hudson	J. H. Benfer	.00268
*12	Klinekar	J. A. Kline	
CLASS CC—RUNABOUT, ABOVE $1,501			
4	Hudson	J. A. Kline	.00683
16	Cadillac	A. M. Dick	.00430
11	Klinekar	C. E. Covert	.00531

†Four passenger
*Withdrawn

PULLMAN SOCIABILITY HELD

York, Pa., Nov. 11—The first sociability run of the Pullman Automobile Co., of Philadelphia, was held today from the Quaker City to York. Fifteen Pullman cars were entered by owners from Philadelphia and Reading. The Quaker City participants left 662 North Broad street, and the first car was off on its trip to York at 10:15 a. m. The other fourteen cars left at 1-minute intervals and went as far as Lancaster where a stopover was made for dinner. W. L. Garland, driving a 1911 model K Pullman car won the run. His time between Philadelphia and York, 89 miles, was 5 hours 3 minutes 30 seconds. The time of the run had been fixed at 4 hours 56 minutes 10 seconds. Mrs. W. G. Preston, Philadelphia, won the women's prize for guessing the closest to the elapsed running

time. Her guess was 4 hours 56 minutes, within 10 seconds of the allotted time. The route was via Paoli, Coatesville, Lancaster, Columbia and York.

NATIONAL AND CINO SHINE

San Antonio, Tex., Nov. 13—A 3-day track meet run by the San Antonio club was completed this afternoon, the feature of which was a 4½-hour race, split into three sections of 1½ hours a day. This was won by a National driven by Sutherland, the car covering 225 miles in the 4½ hours. Second was a Jackson driven by Meleun with 216 miles; third was an E-M-F driven by Reeves, 213 miles; fourth was a Staver-Chicago driven by Knudsen, 203 miles, and fifth was a Flanders driven by Potter, 195 miles. Ten originally were scheduled to start, but the Cutting went out early because of a loose radiator, while a Flanders caught fire at the pits and was withdrawn.

Originally the meet was scheduled to start last Thursday, but the weather conditions were such that the ¾-mile track was deemed unsafe, so the actual racing was postponed to Saturday, continued yesterday and finished today. Before the start of the long grind each day there were short-distance races in which the Cino did especially well. The summaries of the 3 days of racing follow:

FIRST DAY

Sixteen laps, 12 miles, class C, division 3C, nonstock—Raimey, Cino, won; Monckmeier, Staver-Chicago, second; Reeves, E-M-F, third. Time, 13:49. Six starters.

Match at five laps between George Clark in Cutting and Fred Meleun in Jackson—Won by Clark. Time, 4:22⅘.

Twenty-eight laps, 21 miles, class D, nonstock, free-for-all—Raimey, Cino, won; Meleun, Jackson, second; Monckmeier, Staver-Chicago, third. Time, 24:29. Ten starters.

First section of 4½-hour race, 1:02:51—National, 72 laps; Ohio, 72; Jackson, 71; Staver-Chicago, 69; Cino, 68; Staver-Chicago, 66; E-M-F, 63; Pope-Hartford, 56.

SECOND DAY

Twelve laps, 9 miles, class C, division 3C—Raimey, Cino, won; Knudson, Staver-Chicago, second; Monckmeier, Staver-Chicago, third. Time, 9:53⅘. Four starters.

Free-for-all, twenty laps, 15 miles—Sutherland, National, won; Monckmeier, Staver-Chicago, second; Meleun, Jackson, third. Time, 16:41⅘. Five starters.

Four and a half hour race, finish of third hour—National, 202 laps; Jackson, 195; E-M-F, 187; Staver-Chicago, 177; Flanders, 171. Leader's mileage, 151½.

THIRD DAY

Sixteen laps, 12 miles, class C, division 4C—Clark, Cutting, won; Sutherland, National, second; Meleun, Jackson, third. Time, 12:56⅕.

Twenty-four laps, 18 miles, class E, 161-300 class—Raimey, Cino, won; Reeves, E-M-F, second; Knudsen, Staver-Chicago, third. Time, 21:05.

Final result of 4½-hour race—National, Sutherland, 225 miles; Jackson, Meleun, 216 miles; E-M-F, Reeves, 213; Staver, Knudsen, 302; Flanders, Potter, 195.5.

SUIT FILED AGAINST ARGYLL

Chicago, Nov. 15—L. B. Kilbourne today received a cablegram from his partner, Charles Y. Knight, of Coventry, England, notifying him that suit has been brought against the Argyll people who have just brought out a sleeve-valve motor which was shown for the first time at the Olympia show. While the cablegram does not say so, it is supposed that the suit is for alleged infringement of the patents held by Mr. Knight.

Phoenix Holds Track Speed Carnival

Contestants in Recent Desert Road Race Given Chance at Prizes Hung Up by Arizona Citizens—Pope, National, Mercer Among Winners—Hanshue and Fuller Injured in Accidents

PHOENIX, Ariz., Nov. 9—Two serious accidents marred an afternoon of sensational racing at the Arizona fair grounds today. Harris Hanshue, of Los Angeles, and Fred Fuller, of El Centro, both driving Mercers, crashed through the fence and miraculously escaped with their lives.

Traveling faster than a mile a minute, Hanshue punctured the inner railing on the fourth turn of the mile track. An examination of Hanshue proved that he had received only a severe wound in the head, a strained hip and various bruises. There were no internal injuries. Fuller was only shocked. His car was a wreck, but Hanshue's machine left the grounds under its own power.

Hanshue Has Close Call

Hanshue's accident occurred during the 10-mile handicap race for all the cars that participated in the Los Angeles-Phoenix road race. For several miles the Franklin and National were struggling for first place, then the Mercer moved up until it was just behind the National, which Ed Swanson, mechanician to Harvey Herrick, who won the Phoenix race, was driving. Hanshue took several long chances in attempts to swing in and grab the pole. While he was taking one of these chances a steering knuckle broke and the Mercer rammed a hole in the fence. Before he was thrown out Hanshue had time to jam on the emergency brake.

This race was won by the National, with the Franklin, driven by Guy Irwin, second. The othere starters were W. D. Tremaine in the Pope-Hartford, Bill LaCasse in the E-M-F, George Soules in the Case and Charles Bigelow in the Cadillac. The National was the basis of handicapping. The Flanders was given 50 seconds start; E-M-F and Case, 30; Cadillac, 20; Pope and Franklin, 15; Mercer, 10.

Fuller's accident occurred during the 25-mile free-for-all for cars with a piston displacement of more than 231 inches. Bert Dingley started in the racing Pope, Hanshue in his Mercer, Swanson in the Phoenix road race National, Fuller in the Phoenix race Mercer, Frank Seifert in the National that won the Santa Monica race and Louis Nikrent in a Buick.

Fuller never figured as a possible winner but drove a daring race. He took one chance too many and at the second turn crashed through the outer fence. He went up in the air several feet but came down in the disintegrating car. Fuller suffered severely from the shock and spent the night in a hospital.

The Pope got the best start but the National was close, with Hanshue's Mercer and the other cars strung out behind. Dingley ran wide open and his time for the first 5 miles was 4:46.05; 10 miles, 9:30.36; 15, 14:19.17; 25, 23:52.96. The National was second with the Mercer a close third.

By far the most sensational race of the day was the 10-mile free-for-all. Mile after mile Dingley, in the Pope and Seifert, in the National, struggled for first place. No prettier race ever was seen on any track. The Pope proved to be a little the faster car. Dingley won easily, once he secured the pole. It was during the eighth mile that Dingley took the lead. This mile was covered in :52⅘ and is said to have been the fastest mile ever made in competition.

Five cars started to beat the Phoenix track record of :56, held by Apperson. Both the Pope and National succeeded. The Pope's time was :52¾ and that of the National :52⅘. Louis Nikrent covered the mile in :57.35 with his California Buick; Tom Carrigan in the Midland made it in 1:05.56 and William Ferguson with the Arizona Buick in 1:05.56.

With one exception the time of the Pope is the fastest ever made on the Pacific coast over a mile circular track. The record is :51⅘ seconds and was made by Oldfield with a 200-horsepower Benz.

Four started in the 15-mile event for cars participating in the Phoenix race, having a piston displacement of 301 inches or over. There was a pretty struggle for first place between the National and Nikrent's Buick, but the National won. Its time for 5 miles was 4:57.55; 10 miles, 9:43.22; 15, 14:37.67. The Buick was second, with the Franklin third and the Midland a bad fourth.

Hanshue was the hero of the 10-mile race for cars in the Phoenix race having a displacement under 301 inches. They finished with the Mercer first, Cadillac second, Case third, E-M-F fourth and Cole fifth. The Cole was distanced, owing to a cracked cylinder. Hanshue's time for the 10 miles was 10:34.05.

A National Victory

There was a special event for the cars in the Phoenix race that arrived first, second, third and fourth, but W. D. Tremaine's Pope, which came in fourth, did not start. The National took the lead and easily held it to the end, winning in 10:15.56. There was a fight between the Cadillac and the Franklin for second place but the Cadillac won out.

An attempt was made by George Soules, in a Flanders to lower the 5-mile circular track record for 20-horsepower cars. The record is 5:42, but the best that Soules could do was 5:57.51.

Uncle Sam Reports on Motor Industry

Census Bureau at Washington Supplements Its Statement of Last April Which Shows Status of Business in 1909 and Makes Interesting Comparisons With Season of 1904

WASHINGTON, D. C., Nov. 13—No statistics are harder to gather than those connected with the motor industry. Men familiar with the manufacture of cars have attempted to satisfy the curiosity of the public regarding the value and number of the product and while they doubtless have come close to the mark their statistics have not been backed up by anything at all authoritative. With at least two big national organizations in the country and with not all the manufacturers identified with them, it has been hard to back up the compilations. There's only one organization that can probe into the secrets of the motor industry and drag forth figures that are authoritative—that is the census bureau of the United States government.

Your Uncle Sam counts noses every 5 years and his reports always carry weight, for his agents have access to the inner circle. True, the reports generally are a couple of years late but to the student who is in search of facts these census reports carry weight. The government has just announced the results of the 1909 probe, a follow-up on the preliminary report which was made last April, the report being compiled under the direction of William M. Steuart, chief statistician for manufactures of the census bureau.

The Government Estimate

According to the census bureau there were 127,289 motor cars of all kinds made in 1909, the total value of which was $165,115,100. To produce all these cars, taking into consideration every branch of the industry, cost in the way of salaries alone $58,173,000, of which amount $9,479,000 was paid to officials and clerks and the remainder to workmen. This makes the average salary of the official and clerk $1,036 and the wage of the workman $629. The two, averaged, shows $687 annually, which would tend to dispel the illusion that there is extravagance shown in the way of salaries in the motor industry so far as the manufacturing end is concerned.

Getting back to the census report though, the report made yesterday by the census bureau is interesting. The summary shows increases in all the items at the census of 1909 as compared with that for 1904.

The number of establishments increased 317 per cent; capital invested, 653 per cent; the gross value of products, 730 per cent; cost of materials, 901 per cent; value added by manufacture, 596 per cent; average number of wage earners employed during the year, 528 per cent; amount paid for wages, 580 per cent; number of salaried officials and clerks, 682 per cent; amount paid in salaries, 654 per cent; miscellaneous expenses, 289 per cent; primary horsepower, 647 per cent.

There were 743 establishments in 1909 and 178 in 1904, an increase of 317 per cent.

The capital invested as reported in 1909 was $173,837,000, a gain of $150,753,000, or 653 per cent, over $23,084,000 in 1904. The average capital per establishment was approximately $234,000 in 1909 and $130,000 in 1904.

The value of products was $249,202,000 in 1909 and $30,034,000 in 1904, an increase of $219,168,000, or 730 per cent. The average per establishment was approximately $335,000 in 1909 and $169,000 in 1904.

Cost of Materials Used

The cost of materials used was $131,646,000 in 1909, as against $13,151,000 in 1904, an increase of $118,495,000, or 901 per cent. In addition to the component materials which enter into the products of the establishment for the census year there are included fuel, rent of power and heat, and mill supplies.

The value added by manufacture was $117,556,000 in 1909 and $16,883,000 in 1904, an increase of $100,673,000, or 596 per cent. This item formed 47 per cent of the total value of products in 1909 and 56 per cent in 1904. The value added by manufacture represents the difference between the cost of materials used and the value of products after the manufacturing processes have been expended upon them. It is the best measure of the relative importance of industries.

The miscellaneous expenses amounted to $20,872,000 in 1909 and $4,266,000 in 1904, an increase of $16,606,000, or 389 per cent. Miscellaneous expenses include rent of factory or works, taxes, and amount paid for contract work, as well as such office and other expenses as can not be elsewhere classified.

Salaries and Wages

The salaries and wages amounted to $58,173,000 in 1909 and $8,416,000 in 1904, an increase of $49,757,000, or 591 per cent.

The number of salaried officials and clerks was 9,233 in 1909 and 1,181 in 1904, an increase of 682 per cent; their salaries increased from $1,257,000 to $9,479,000, or 654 per cent.

The average number of wage earners employed during the year was 75,721 in 1909 and 12,049 in 1904, an increase of 528 per cent; their wages increased from $7,159,000 to $48,694,000, or 582 per cent.

The primary horsepower was 75,550 in 1909 and 10,109 in 1904, an increase of 647 per cent.

The average horsepower per establishment, considering all establishments, was approximately 102 horsepower in 1909 and 57 in 1904.

Number and Value of Cars

The summary of number and value of machines by kind of power includes all the machines made either as a chief or minor product, whether by establishments classified as "Motor cars, including bodies and parts," or under other designations in accordance with their chief products. There was a total of 316 establishments making one or more machines in 1909, and 168 in 1904, an increase of 88 per cent. The number of machines increased from 22,830 to 127,289, or 458 per cent. Of these, gasoline increased from 19,837 to 121,274, or 511 per cent; electric, from 1,425 to 3,639, or 155 per cent; and steam, from 1,568 to 2,376, or 52 per cent.

Of the total number of cars, 122,505, or

NUMBER OF MOTOR CARS, CLASSIFIED BY HORSEPOWER RATING, IN 1909

CLASS	Total number	HORSEPOWER: Less than 10	10 but less than 20	20 but less than 30	30 but less than 50	50 but less than 90	90 or more
Total	127,289	7,542	29,657	35,380	51,457	3,224	29
Pleasure and family vehicles	122,505	7,217	27,807	33,905	50,488	3,059	29
Buggies	4,582	482	3,705	339	56	....	..
Runabouts	36,496	4,538	17,818	10,933	3,043	157	7
Touring cars	76,433	177	5,415	21,878	46,117	2,825	21
Closed	3,968	1,571	855	729	749	63	1
Other varieties	1,026	449	14	26	523	14	..
Public conveyances	1,428	10	630	637	207	44	..
Cabs	1,203	....	627	521	55	....	..
Omnibuses	225	10	3	16	152	44	..
Government, municipal, etc	68	5	2	12	33	16	..
Ambulances	32	5	2	6	17	2	..
Patrol wagons	36	....	....	6	16	14	..
Business vehicles	3,288	310	1,218	926	729	105	..
Delivery wagons	1,875	264	884	628	98	1	..
Trucks	1,401	46	330	297	627	101	..
Other varieties	12	....	4	1	4	3	..

This table is reprinted from Motor Age, April 27, 1911, which contained the preliminary report of the census bureau.

Prosperity Among Michigan Car Makers

96 per cent, were pleasure and family vehicles; 1,428, or 1 per cent, public conveyances; 68 were for government and municipal purposes; and 3,288, or 3 per cent, were business vehicles.

The largest number of machines, 51,457, or 40 per cent, were rated at 30 but less than 50 horsepower; those rated at 20 but less than 30 numbered 35,380, or 28 per cent; those at 10 but less than 20, 29,657, or 23 per cent; and those at 50 but less than 90, 3,224, or 3 per cent. There were 7,542 less than 10 horsepower and only 29 rated at 90 or more.

If the motor cars and bodies and parts made in the 245 establishments engaged primarily in the manufacture of other products be added to the figures in the general summary, the total value of products in 1909 becomes $254,585,000. In 1904 the by-products reported make the total value $30,913,000.

The Tabular Summaries

Comparative summaries follow, giving the general statistics for the industry; the number, kind, and value of machines, 1909 and 1904; and the horsepower rating by classes, 1909.

CARS, BODIES AND PARTS—GENERAL SUMMARY: 1909 AND 1904.

	CENSUS 1909	CENSUS 1904	Per cent of increase, 1904-1909
Number of establishments	743	178	317
Capital	$173,837,000	$23,084,000	653
Cost of materials used	$131,646,000	$13,151,000	901
Salaries and wages	$58,173,000	$8,416,000	591
Salaries	$9,479,000	$1,257,000	654
Wages	$48,694,000	$7,159,000	580
Miscellaneous expenses	$20,872,000	$4,266,000	389
Value of cars made[1]	$164,216,000	$23,751,000	591
All other products[2]	$84,986,000	$6,283,000	1,253
Value of products	$249,202,000	$30,034,000	730
Value added by manufacture (products less cost of materials)	$117,556,000	$16,883,000	596
Employees: Number of salaried officials and clerks	9,233	1,181	682
Average number of wage earners employed during year	75,721	12,049	528
Primary horsepower	75,550	10,109	647

[1] In addition, in 1909, 719 motor cars, valued at $899,000, and in 1904, 1,138, valued at $879,000, were made by establishments engaged primarily in the manufacture of other products.

[2] In addition, in 1909, bodies and parts to the value of $4,484,000 were made by establishments engaged primarily in the manufacture of other products.

NUMBER AND VALUE OF MACHINES, BY KIND OF POWER, AND PER CENT OF INCREASE: 1909 AND 1904.

KIND OF MACHINES	1909	1904	Per cent of increase
Number	127,289	22,830	458
Value	$165,115,100	$24,630,400	570
Gasoline— Number	121,274	19,837	511
Value	$155,068,100	$20,446,100	658
Electric— Number	3,639	1,425	155
Value	$6,564,500	$2,496,300	163
Steam— Number	2,376	1,568	52
Value	$3,482,500	$1,688.000	106

Reports Show Factories Outside of Detroit Are Expanding and Doing Good Business—Packard Completes Sale of $200,000 Worth of 5-year 5 per cent Notes—Trade Gossip

DETROIT, MICH., Nov. 13—The same activity that prevails in the big motor car plants here, as previously reported, exists in the smaller factories of Detroit and Michigan, and the smaller manufacturers are quite as optimistic as the big fellows for the future of the industry and the year 1912 in particular.

Fred Postal, of this city, who is vice-president of the Lion Motor Car Co., has just returned from a visit to the company's plant in Adrian, Mich., and is enthusiastic over the way business is coming.

"We are running full time every day," said Mr. Postal. "We are employing between 200 and 250 men, and Superintendent Humphrey is planning to put on a night force in a couple of weeks. At the rate orders are coming in the season's output will be pretty close to 2,500 cars, which is just about our present capacity."

Substantial improvements are under way at the Marquette plant of the General Motors Co., in Saginaw, for which a liberal appropriation has been made. There now are more than 200 employes and the force is being increased steadily. The semi-monthly payroll is about $8,000. Machinery is being installed in the new machine shop completed some time ago. Appropriations also have been authorized for a complete heat-treating department, fully equipped with all modern appliances, at a cost of $4,500, and for the installation of a new 200-horsepower boiler. Designs have been furnished and accepted at headquarters for a new model high-grade 50-horsepower roadster, on which deliveries will soon begin. The schedule for the shipment of cars from the Marquette plant up to May 1, 1912, calls for 180 model 28s and 220 of models 22, 24, 25 and 27. Model 25 is a new five-passenger touring car.

Other Contracts Let

The citizens of Windsor, Ont., have approved the concessions made by the city council to the Hupp Motor Car Co. in the way of a bonus, and contracts have been let for the construction of the company's Canadian branch factory in that city. The plans call for a one-story building of brick construction. The Cadillac Motor Car Co. has let contracts for the erection of a new power building at its plant on Cass avenue. The Kelsey Wheel Co. is building a large brick addition to its factory on Military avenue.

Workmen started, last Thursday, to clear the land at Woodward avenue and the outer belt line railroad, where the new plant of the Chevrolet Motor Car Co. is to be erected. It is expected that work will begin on the foundations about the first of the year. It will take that long at least to remove the brush and timber from the property. Tentative plans for the buildings have been agreed upon. The main building, where the offices will be located, will have a frontage of 600 feet on Woodward avenue, and will be five stories high. The shops will be built at right angles to the main structure. Barring delays in the construction work, the plant will be in operation early next summer.

Packard Sells Bonds

The Packard Motor Car Co. has completed the sale of $2,000,000 worth of 5-year 5 per cent notes through William A. Read & Co., of New York. The company arranged for an issue of $3,000,000, but $1,000,000 will be held in reserve for future use, if needed. The proceeds of the sale will be used to refund floating indebtedness of the company. The maturity date was prudently set far enough ahead to clear two presidential elections. During this period the company will have the loans that are usually in the form of bank paper definitely placed, without running any risk of having loans called in or of banks refusing to renew paper, no matter what the financial conditions may be. The Packard has no bonded debt, so the notes will stand as a first lien on the assets. It is stipulated, however, that if a bond issue is made within the 5-year period, the notes shall first be taken up. It is said that the $2,000,000 issue sold very rapidly.

The newly-organized Little Motor Car Co., of Flint, has placed on record, in Genessee county, a mortgage for $2,000,000 to secure a short-term bond issue. The mortgage runs until 1916 and the Detroit Trust Co. is trustee under the bonds. C. M. Begole has been elected president of the new company and W. S. Ballinger, secretary.

R. C. Hupp, head of the Hupp Corporation, has found it necessary to make two important additions to his executive staff, owing to the demand for Hupp-Yeats electrics and the new R. C. H. gasoline car. F. R. Bump, who has been general sales manager for the Universal Motor Truck Co. for several months past, becomes assistant general manager in charge of the sales, advertising and service departments, and R. T. Wingo leaves the Cadillac Motor Car Co., to become assistant general manager in charge of production. Mr. Bump was general sales manager for the H. H. Franklin Mfg. Co., of Syracuse, maker of the Franklin car, from 1904 to 1910. Mr. Wingo was with the Brown & Sharpe Mfg. Co. for nearly 22 years.

Capital Highway Important To South

Recent Trip of Scouts of Touring Club of America Develops Interesting Facts and Throws Light on Possibilities of Motor Travel on Other Side of Mason and Dixon Line—Some Facts and Figures

By Henry McNair

NEW YORK, Nov. 14—The most flattering thing you can say to Atlantans is that they live in the New York of the south, and that Peachtree street is their Broadway. Indeed, it is harder to drive a car through Peachtree street than through Broadway, because all the north and south travel is crowded onto this comparatively level thoroughfare and the traffic regulations are nil, each cart, car or carriage being a law unto itself. The street lights of lower Peachtree street are more picturesque and illuminating than those of Broadway, and, while it lacks the skyscrapers and electric signs of the Great White Way, there is still the air of a bustling metropolis which the northern visitor is scarcely prepared to see.

There are about 12,000 motor cars registered in Georgia, of which more than 3,000 are in Atlanta, being one to every tenth family. This, with other considerations, makes Atlanta the logical touring center of the south, and consequently the most desirable point to be linked with New York by trunk lines of motoring highway. So much attention has been directed to the so-called national highway by the recent Glidden tour that the unthinking may have lost sight of that other movement for the improvement of the capital highway, which has recently been covered in toto by the scouts of the Touring Club of America.

Movement Has Good Start

This movement has been fostered by the Capital Highway Association, of which Leonard Tufts is the president, and so much work has been done within the past 3 years that today more than two-thirds of the road between New York and Atlanta is in excellent touring condition, and the balance is being rapidly worked on. All of this improvement below Richmond consists of building sand-clay roads, which when properly constructed are equal to macadam. The peculiar physical location of this route gives particular encouragement to the use of these materials, for it approximately skirts the edge of the clay belt, and in some cases one can literally dig sand from one side of the road and clay from the other. Then, too, it reaches the capital of every southern state which it traverses, including the national capital at Washington, to say nothing of the numerous winter resorts, such as Pinehurst, Camden and Aiken.

On the other hand, the so-called national highway encounters neither metropolis nor capital of any state between Philadelphia and Atlanta, its best-known towns being Mt. Crawford and Harrisonburg. The only point on the capital highway of which the tourist should be warned is Culpeper, Va., where a speed trap exists.

The first day's run of the recent scouting tour of the T. C. A. was made from Atlanta to Augusta, following closely the Georgia Central Railway. The distance is 172 miles and was covered in 10 hours elapsed time through a driving rain. The only bad stretch is 20 miles between Madison and Greensboro, which is mostly slippery red clay. Beyond Greensboro the road is sandy, the last 20 miles being built of the famous cement gravel which is found in abundance in this section. Augusta is amply provided for the accommodation of tourists with three magnificent winter hotels and two first-class all-the-year-round hotels.

South Carolina Conditions

Crossing the Savannah river at Augusta the scouts entered South Carolina and found on the way to Aiken much improved sand-clay road. Aiken is also a well-known winter resort, whose most famous restaurant is conducted by a former chef of William C. Whitney. The road between Aiken and Columbia is in greater part sand-clay, but it has not received the attention it deserved, and consequently is full of ridges, where the crown is too high, and full of holes where the surface is too flat. An escort car from Columbia which was piloting the tourists into that city struck one of these holes, and was promptly put out of business by the breaking of a front axle.

Columbia is an enterprising city, with several good hotels and a particularly excellent garage, the manager of which states that he has already sold seventy-three cars for 1912 delivery. The first 15 miles out of Columbia was considered at one time the best example of sand-clay road in America, but this, too, has been allowed to deteriorate, though one can still make excellent time over it. About half of the remainder of this road to Camden has been improved, and work is still in progress. None of the winter hotels was open at Camden, so the tourists pushed on to Cheraw for luncheon stop, where an excellent new hotel furnishes first-class accommodations, supplemented by a complete garage and machine shop.

This stretch varies from very good to very bad, but in no place is progress difficult. From Cheraw to the state line was encountered one of the worst stretches of the trip, where little improvement has been made, the sand being particularly heavy in spots. This, of course, can be easily remedied by applying layers of red clay. Entering North Carolina, the road immediately improved, and continued excellent through Rockingham, a cotton manufacturing town, with hotel and garage accommodations. A short stretch of narrow, sandy road is encountered after one turns off the main road into the pine woods, but the last 15 miles entering Pinehurst was the best of the trip thus far, due particularly to the fact that it had been dragged. This is done with a split-log drag, at an annual cost of $5 per mile, not a very great outlay, when the price of springs and tires are considered. This particular stretch of road was built by Leonard Tufts at his own expense, which is also true of the roads leading out of Pinehurst in every direction.

In the village itself are some sand-clay roads, which have every appearance of macadam. The direct road from Pinehurst to Raleigh is 81.7 miles, but, owing to the fact that little interest in improvements is manifested along this route, the scouts were advised to go by way of Fayetteville, which has recently issued bonds for $200,000 and is at present completing the road between Pinehurst and Fayetteville. From Fayetteville to Dunn the road is fair, with no bad places. Beyond Dunn much work is being done by convicts in the way of grading and bridges, so that another year will see a decided improvement in this stretch. After passing through Harnet county one encounters some very poor narrow sandy roads, which can only be compared with those in Florida. Upon entering Wake county the road gradually improves, and is fine as one nears Raleigh, the capital of North Carolina, and famed as the birthplace of Andrew Johnson, the old cabin having been removed to a permanent location in the park. Raleigh, however, is not as progressive as some of the other southern cities, and has not given the roads in the vicinity as much attention as the neighboring cities of Durham and Henderson, both of which are wide-awake, progressive communities.

Good Roads Encountered

After crossing the Neuse river a splendid new road is followed, which, though winding, is of excellent construction, and the 45 miles to Henderson is handily covered in 2 hours. From Henderson to Roanoke Rapids, a cotton milling town, the road is fair-to-good, but, after crossing the Roanoke river, where the usual toll of 50 cents was remitted, a stretch

of very heavy sand was encountered for about 10 miles. This was amply compensated, however, by the magnificent stretch of sand-clay road from Barley to Emporia, a distance of 15 miles. Here a speed of 40 miles can be made without a jolt and with very little dust. This road has been built over a year, and shows no signs whatever of deterioration, the original cost being about $500 a mile.

Emporia is quite a motoring town on the Meherrin river. After leaving Emporia the old coast-line right-of-way is followed for a short distance. Then comes a stretch of well-graded road, which needs a proper dressing of sand-clay. Fifteen miles out begins the most wretched part of the whole capital highway, which extends about 7 miles to Stony creek. From Stony creek the old coast-line right-of-way is followed all the way into Petersburg. This with slight improvement can be made excellent for traveling, as there are no grades, and there is a splendid foundation for road metal.

Historic Battleground on Route

Near Petersburg is passed Poplar Grove national cemetery, and here was one of the most hotly contested battlegrounds of the civil war. From Petersburg to Virginia a wide boulevard 23 miles long was covered in 40 minutes. The scouting tour was terminated at the Hotel Jefferson, the cars having covered 715 miles in less than 5 days, but would be more comfortably taken as a tour in 6.

While at present it is not on the whole a trip which could be recommended as comparable with a similar tour in the north, but with the improvements now in progress and with careful driving the trip can be made in comfort and with a considerable degree of pleasure. Among other interesting things along the way which attract the tourists may be mentioned the cypress swamps, cotton fields, peanut patches and the persimmon trees, loaded with luscious looking fruit, which is likely to be puckery before the frost.

FINISHES LONG TOUR

New York, Nov. 14—That future transcontinental travel will be limited to two southern routes is the prediction of B. O. Tilden, president of the American Sanitary Works, of New York, who has just completed a double cross country trip in a 50-horsepower Stoddard-Dayton car, arriving in New York on November 6.

Mr. Tilden's return trip from the coast was made over what was presumed to be a practical northern route beginning at Vancouver, B. C., and taking an irregular course through Washington, Idaho and Montana, but in crossing the Cascades, Coeur d'Alene and Rocky mountains he encountered such fearful road conditions that he believes ocean-to-ocean travel will be entirely diverted to southern routes via Phoenix or Salt Lake City.

Returning at a time when the trail was supposed to be better than at other seasons of the year, he was surprised to find many sections of Washington and Montana blanketed in deep snow and the route through the mountains was entirely lost in the gigantic drifts. In lowland sections he was compelled to battle with mud through which it was possible to make only a few miles each day and dozens of washouts made it necessary to build bridges.

While considerable difficulty was anticipated, the business nature of his trip compelled him to continue at all hazards, but he declared that he would never attempt it again and he sees nothing but extreme danger under the most favorable circumstances. Therefore his report will probably deter any one who contemplates following the northwestern route.

Mr. Tilden's purpose was to call upon the forty representatives of the American Sanitary Works, making detours of 100 to 500 miles from forty cities in order to go over the territory of each salesman.

STUDYING ROAD-BINDERS

Washington, D. C., Nov. 11—As a large part of the road work in this country seems destined to be effected by the use of tars in road treatment and construction, a systematic investigation of the effect of various constituents upon the adaptability of tars as road-binders is now being made by the good roads division of the department of agriculture. The department has prepared a monograph on the effect of naphthalene upon the consistency of refined tars. While definite conclusions are not announced, the results strongly indicate four determinate facts, as follows:

That the fluxing value of naphthalene for tar pitches is somewhat greater, although quite similar, to the heavier naphthalene-free tar distillates, until the mixture becomes saturated with naphthalene.

That for the harder tar pitches the addition of very small percentages of naphthalene will produce a marked increase in fluidity of the resulting product.

That for the softer pitches the addition of naphthalene in small quantities causes less increase in fluidity than for the harder pitches.

That where napthalene is added beyond the point of saturation a rapid decrease in the fluidity of tars at temperatures below the melting point of naphthalene is observed, but at temperatures above its melting point the fluidity continues to increase.

ANOTHER WEED CHAIN VICTORY

New York, Nov. 15—Special telegram—Another victory for the Weed Chain Tire Grip Co. and the Parsons Non-Skid Co., upon the patents on which the former bases its product was scored in the United States circuit court for the southern district of New York when Judge Lacomb signed an interlocutory decree affirming the right of the complainants in the patent and issuing a permanent injunction against the E. J. Willis Co., of Boston, and waiving the prohibition so as to cover the Whitaker Chain Tread Co. also.

The decree appoints Commissioner Shields to take testimony for an accounting but not the parties and when that is done the decree may be made final. In the meantime the respondents have the right to appeal the case to the circuit court of appeals, which probably will be done.

The Weed chain makers are in the midst of an extended battle to assert their rights under the Parsons patents and at this time there are still pending 175 suits against various alleged infringers of these patents. In this number of cases preliminary injunctions have been granted while several final decrees have been entered against different infringers.

The amount of money involved in the present litigation is considerable but it has not been definitely determined and will not be until Commissioner Shields has finished hearing the testimony.

The interlocutory decree connects the Whitaker company with the respondent in this language: "The E. J. Willis Co., without right or license from the complainants making, selling and using chain grips known as the Whitaker chain grip made by the Whitaker Chain Tread Co., which has conducted the case of the respondent."

Frederick S. Duncan conducted the case for the complainants. The patent under consideration is No. 723,299, granted August 24, 1903.

CRUDE RUBBER JUMPS

Akron, O., Nov. 13.—A small rise in the price of crude rubber is noted by Akron tire manufacturers, though the increase is not sufficient to disturb plans and estimates that have been made for 1912. This week's quotation has been around $1.05 a pound.

"Conditions in crude rubber," says W. W. Wuchter, president of the Swinehart Tire and Rubber Co., "are much easier than they were a year ago, and I do not anticipate a return to the conditions that hampered rubber manufacturers then. Manufacturers are enabled to make their estimates and go into contracts with reasonable assurance that prices will not jump after the contracts are made, and profits thus be interfered with."

The rubber market is watched closely by Akron tire manufacturers. Thousands of tons of the crude product are used here annually, and when it is remembered that this crude material costs a minimum of $1 a pound and has been as high as $3 a pound, local interest in the rubber market can be readily understood. The large importers of crude rubber with headquarters at New York and Boston maintain Akron offices the year round, with representatives on the job all the time to secure the Akron orders, which often amount to more than a million dollars at a time.

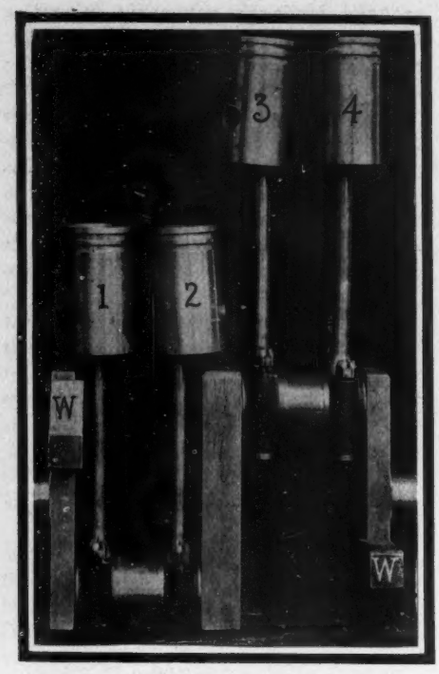


FIG. 1—SIZAIRE-NAUDIN CRANKSHAFT
Two-throw shaft for four-cylinder long-stroke motor

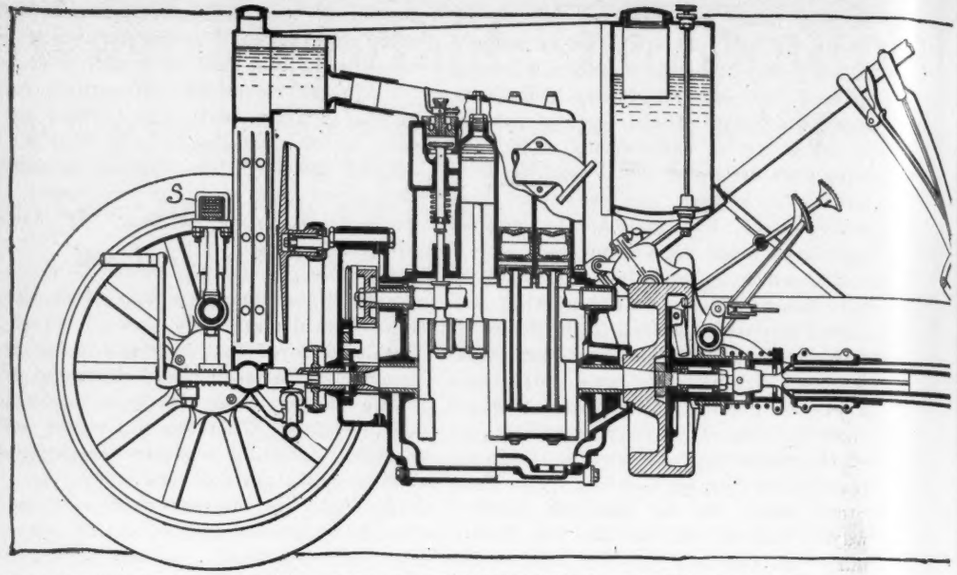


FIG. 3—SECTION OF FORWARD PART OF SIZAIRE-NAUDIN CHASSIS, SHOWING LONG-STROKE MOTOR WITH TWO-BEARING CRANKSHAFT

Trend of French Industry

PARIS, France, Nov. 1—French manufacturers are of the opinion that they can sell motor cars without the aid of a costly annual exhibition. Consequently the Grand Palais in the Champs Elysees will remain empty this year. But although there is not any home show, the Frenchmen cannot ignore their agents in London who are demanding to be supplied with the latest models to exhibit by the side of English cars in the Olympia hall during the first week in November. The general policy is to supply whatever models may be ready for putting on the market. Had the show been held at home, experimental work would have been hurried forward, even at the expense of quality, in order that something in the nature of a novelty might be shown to the public. A dozen instances could be mentioned of leading firms who could, if they wished, present entirely new models at the London show; but they are not disposed to be hustled for a foreign event. In one case the Reno-Bois valveless motor has been adopted and even manufactured, but as the cars have not gone through the regulation test on the road, they are being kept back; another firm is satisfied with its tests of a rotary-valve motor of its own invention, but will not bring it out for the show; a third has a new six-cylinder model which has accomplished about 8,000 of the necessary 10,000 miles of tryout: here again it is being kept back. Still another has a new type of small-bore, long-stroke motor which would be produced if the show were in Paris, but which will not be hurried forward for London.

It is obvious that the direct outcome of the abandonment of the annual show is to break down the season model idea. French firms are now disposed to change their models when they feel the time is ripe for a change, introducing new types with a total disregard to the seasons and refusing to be hustled into the presentation of novelties on a fixed date. Much can be said in favor of the change, last year's show being a striking example of the futility of making inventors work to a time table. As valveless motors were then in the fashion, a score of firms thought it necessary to secure a little cheap publicity by producing motors of other than the poppet type. Many of them had never made a revolution; some of them were found to have serious defects when they were first cranked, and even the best of them had to undergo a year's refinement before they could be offered to the public with a free conscience. When Olympia opens it will probably be found that there are more changes on the English cars than on those produced on the continent. The Anglo-Saxon will doubtless conclude that the home makers are more inventive than their foreign rivals, forgetting that the former are almost in honor bound to produce a novelty, be it good, bad or indifferent, while the latter, taking only a second-hand interest in the London exhibition, have not thought fit to hurry along models which they know will be on the French market as early as next February or March.

On the whole improvements are in the nature of refinements. There are several reciprocating, sliding and rotary-valve motors; there has been a further lengthening of the stroke in relation to cylinder bore; small, high-efficiency motors are well to the fore, and lubrication has received still further attention. As types of the small-bore, long-stroke, high-efficiency type no better examples could be found than the new models presented by Sizaire-Naudin and Hispano-Suiza, both French firms, for the latter, although having its origin at Barcelona, has now an important factory in the suburbs of Paris. The Sizaire-Naudin is a model which made its debut at the last Paris salon, having been

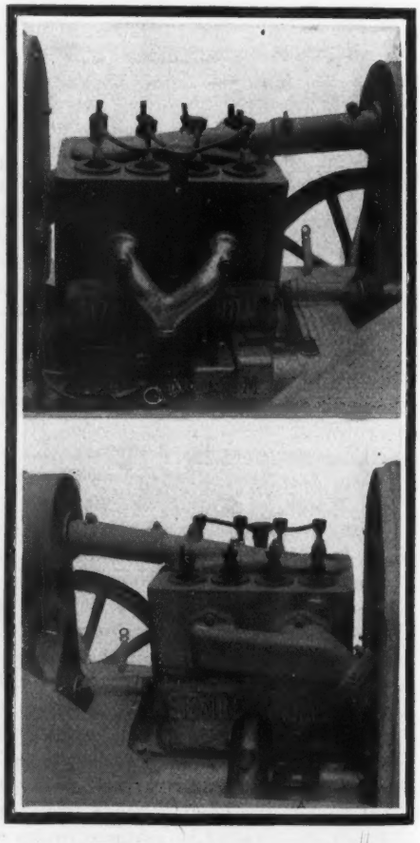


FIG. 2—SIZAIRE-NAUDIN MOTOR, SHOWING INTAKE AND EXHAUST SIDES, WITH LOCATION OF MAGNETO M AND CARBURETER C IN MOTOR CASE

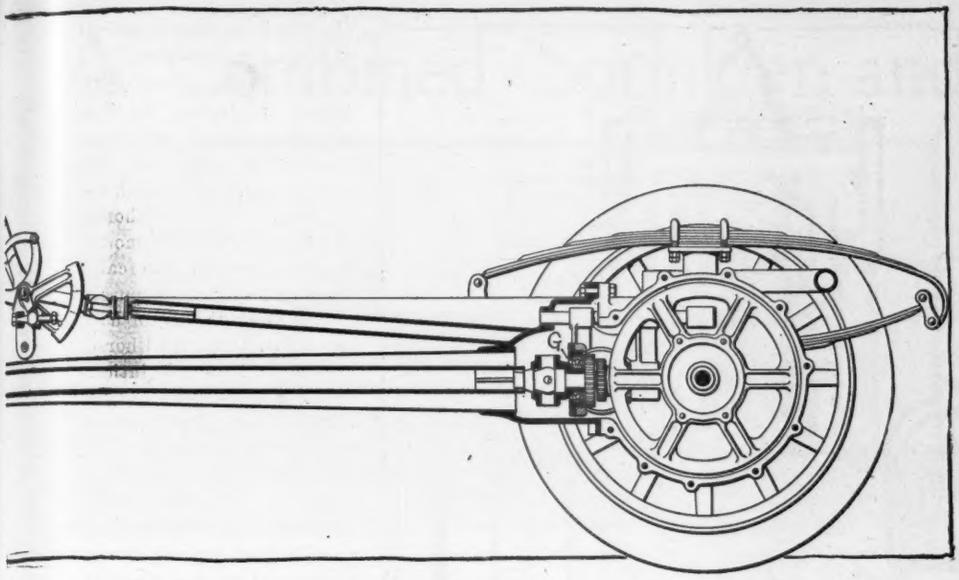


FIG. 4—SIZAIRE-NAUDIN CHASSIS, SHOWING FINAL DRIVE AND ARRANGEMENT OF CONTROL CONNECTIONS

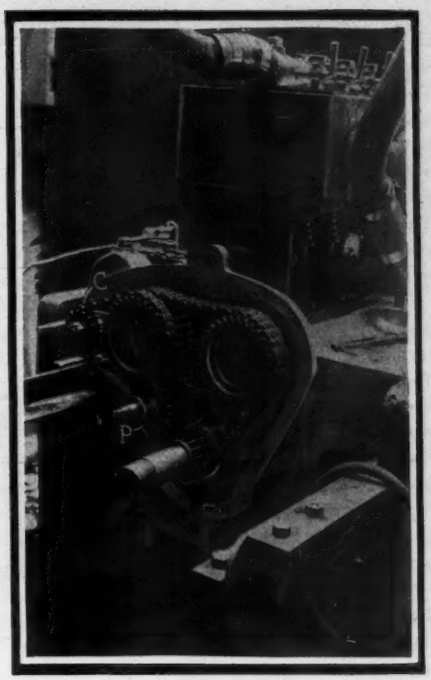


FIG. 6—FRONT OF SIZAIRE-NAUDIN MOTOR

Showing silent chain drive C and tightener pulley P

In the Campaign of 1912

hurried on in response to the call for a novelty, and in consequence presented without having been tested, and indeed without having been completely erected. In the 11 months, which have elapsed since then, it has been tried out, found lacking in details, thoroughly tested, and is now presented as a definite commercial model. The motor is a four-cylinder in one casting of 70 by 170 millimeters, 2.7 by 6.69 inches, bore and stroke, this being a ratio of 2.42 to 1 stroke to bore, or the highest adopted by any manufacturer for a purely commercial model. The objects sought have been high power with a limited bore, extreme simplicity and the maximum of accessibility.

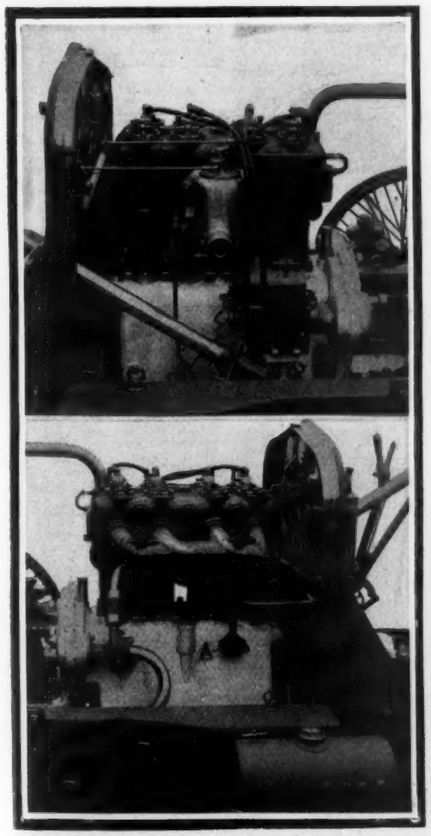


FIG. 5—HISPANO-SUIZA MOTOR, SHOWING INTAKE AND EXHAUST SIDES. THE MOTOR HAS AN EXCEPTIONALLY LONG STROKE COMPARED WITH ITS BORE

To get the shortest possible overall area for the motor, thus obtaining a very short, stiff crankshaft, capable of being carried on two bearings without danger of whipping, there are only two throws, Fig. 1, as in the standard type of two-cylinder motor. Pistons 1 and 2 are connected to the first crankpin and piston 3 and 4 to the opposing one. Balance weights were fitted. In addition to connecting two pistons to one crankpin, there is a single bearing for one pair of connecting rods. Linked up in this way a longer bearing can be obtained than is possible with the standard method of laying out a crankshaft for a close-coupled motor. Both connecting rods and pistons are of unusual length; the connecting rods are tubular and the pistons are of steel with only two compression rings. When first produced this motor was fitted with a ball-bearing crankshaft; this has been abandoned in favor of plain bearings with pressure lubrication.

Instead of mounting the crankshaft in bearings carried in the upper half of a horizontally-divided crankcase, this casting is aluminum without a horizontal division, but with bolted-on end plates receiving the main bearings in the method generally adopted for motors having ball-bearing crankshafts. Another crankcase feature is that there is no distinct motor feet or hangers, the sides of the case being extended out to allow them being mounted directly on the side frame members, thus not leaving any gap between the base of the motor and the frame members. This does away with the necessity of an underpan, an organ which a number of European manufacturers now look upon as unnecessary. Instead of merely forming a full-length motor arm, this portion of the crankchamber is provided with pockets, Fig. 2, in one of which the magneto is housed, in another the carbureter, and in a third is the filler for the oil tank.

The timing gears are in a separate housing at the front of the motor. As the casting is of the T type, there are two camshaft pinions driven by a Renolds silent chain. Experience has shown that the best chains vary a little in length, and that a certain amount of stretch occurs after a few hundred miles' running. To allow for this a fourth pinion P is interposed between the crankshaft and the intake camshaft pinion and is mounted on an eccentric to allow of any slack being taken up without dismounting the cover of the casing. The magneto drive is interesting, there being a second chain C from a pinion mounted on the extremity of the intake camshaft to a pinion on the magneto shaft.

The valves, carried on opposite sides of the motor, have a face diameter of 55 millimeters, 2.16 inches, for a cylinder bore of 70 millimeters, or 2.75 inches. This is exactly the same ratio of valve to cylinder diameter as that employed on the firm's single-cylinder freak racing cars of 3.9 by 11 inches bore and stroke. Just as lightness has been sought in the pistons and connecting rods, every effort has been

made to remove unnecessary weights in the valves. The stems are of considerable diameter, and after having being machined are bored out, then having their extremities plugged up. This gives a valve of extreme lightness combined with great strength.

The motor is an extreme example of what has been termed the slab-sided type. When the covers have been fitted on the valve stems the appearance is that of a metal box, having a single water pipe on the top, a row of spark plugs over the intake valves and a row of compression cocks over the exhaust valves. The magneto is within a housing, the cover of which is held down by a spur clip, and the Zenith two-jet carbureter is also in a housing with a Y-shaped pipe connecting up to the integral intake manifold. On the left-hand side is a short length of water piping passing through a hole in the crankcase arm to the base of the cylinders, and by its side the oil filler for the crankcase.

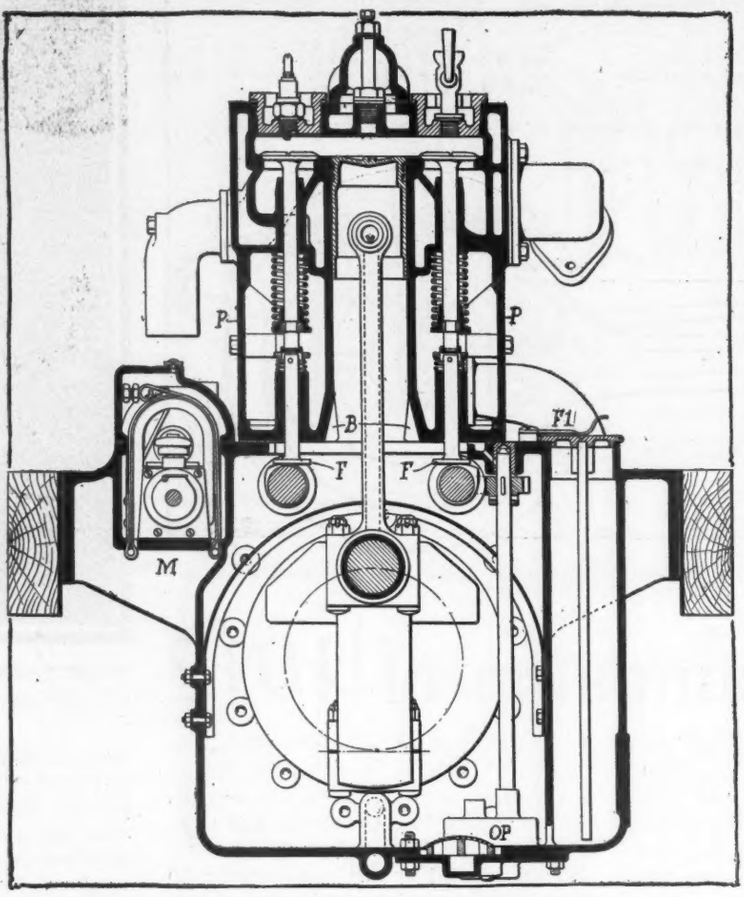


FIG. 8—SECTION OF SIZAIRE-NAUDIN MOTOR, SHOWING HOW MAGNETO M AND OIL FILLER F1 ARE ENCASED IN MOTOR CASE

It has been mentioned that the lubrication is under pressure, the whole of the lower portion of the crankchamber forming an oil reservoir, without anything to divide it from the upper portion. There is sufficient depth, however, for a plentiful supply of oil without any danger of the connecting rods dipping. The oil pump in the base of the crankchamber is worked off the exhaust camshaft by worm gearing and a vertical spindle. It can be withdrawn through the base of the motor by taking out four bolts, and as there is no underpan to be first of all removed, the task is never a difficult one. The necessary level of oil is assured by a circular glass plate let in the face of the lower portion of the crankchamber and having a bar soldered across it to indicate the height to which the oil should be maintained.

For a bore of 80 millimeters, 3.1 inches, the Hispano-Suiza engineers have adopted a stroke of 180 millimeters, 7.08 inches, on their nominal 15-horsepower four-cylinder model. Needless to say the catalog rating is a purely nominal one, the motor having developed 63 horsepower at 2,300 revolutions under a bench test, and the car having a guaranteed speed of 74 miles an hour when fitted as a two-seater. That the guarantee can be lived up to is evident from the fact that the car, driven by an amateur, has officially climbed the Gaillon 10 per cent kilometer grade at an average of 53 miles an hour. Although standard practice is followed in the main, there is very much that is distinctive in the details of the car, and the construction throughout is of the very highest order. The motor is in a single casting with valves on opposite sides, their face diameter being 60 millimeters, 2.36 inches. The intake manifold is cast with the cylinders, while the exhaust manifold is separate and of very large area to allow an uninterrupted flow of the spent gases. Valve stems are not enclosed; the tappets are made adjustable and have very large diameter heads which can be turned round to present a fresh surface to the end of the valve stem as wear develops. The magneto is on the right-hand side back of

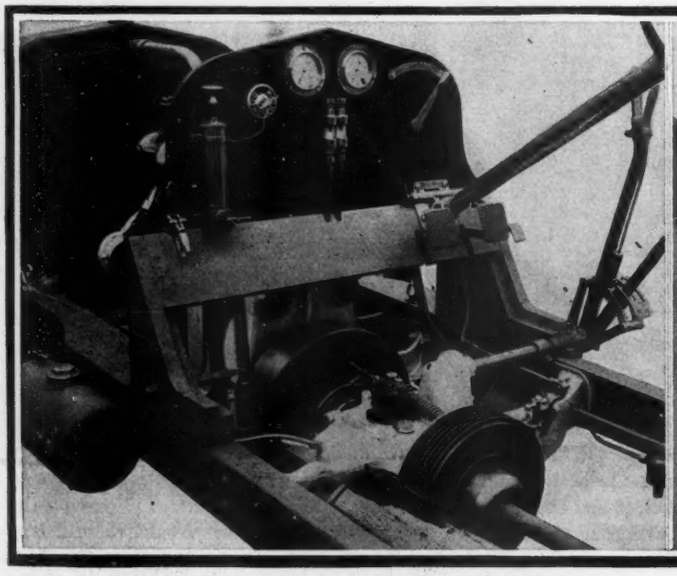


FIG. 9—DASH OF 15-H. P. HISPANO-SUIZA, SHOWING TIRE PUMP ON TOP OF GEARBOX AND THE TWO SIGHT OIL FEEDS TO GEARBOX REAR AXLE

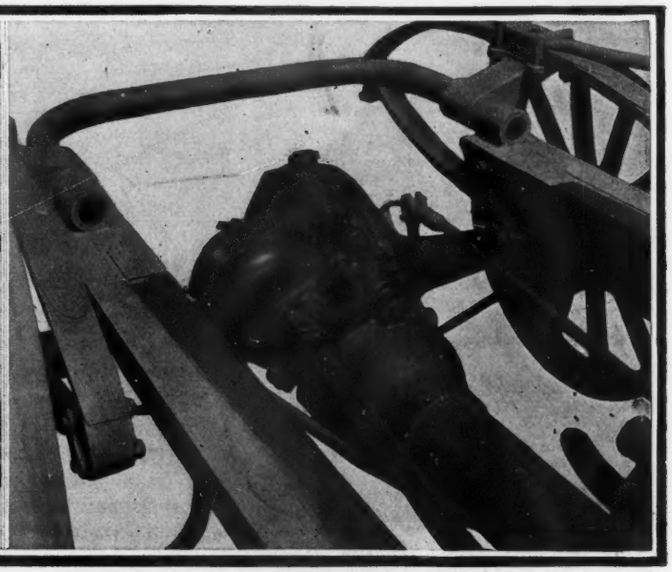
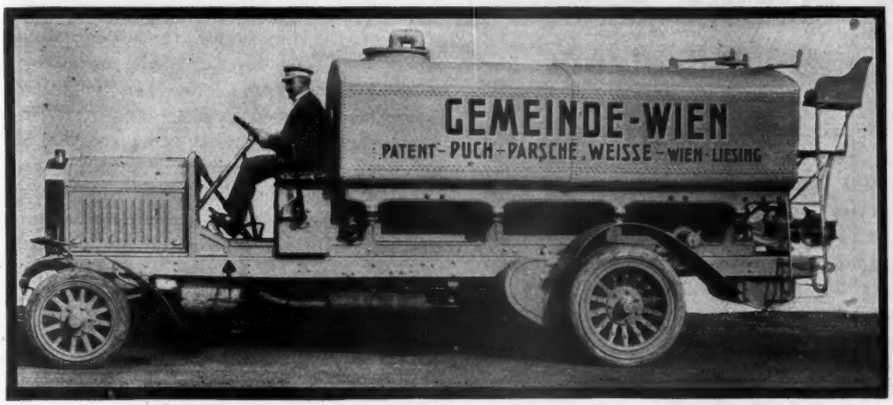


FIG. 12—REAR AXLE OF SIZAIRE-NAUDIN, ILLUSTRATING THE STOUT CONSTRUCTION OF PROPELLER SHAFT HOUSING AND DIFFERENTIAL CASE

A Combined Sprinkler and Fire Engine



COMBINATION SPRINKLER AND FIRE ENGINE MADE IN GERMANY

AN interesting vehicle constructed by Messrs. Johann Puch A.-G. in conjunction with Parsche & Weisse was recently submitted to conclusive tests by the Vienna municipal authorities. The vehicle was at first demonstrated as fire engine, its jet reaching nearly as far as the roof of the city hall. It next started on a demonstration run through the streets of Vienna, showing its capacities as a sprinkling car. The city of Vienna a year ago adopted a similar vehicle of smaller size with a tank containing 950 gallons, which has since been in regular service in its streets. The car now tested is the first of a larger type with a 1,400-gallon tank of which some further units have been ordered. It is reported to have given satisfaction.

The effective load of the vehicle is 6 tons and its own weight 4.8 tons. The weight in working order with filled tank is 9.8 tons, of which 7.3 tons correspond to the rear wheels. The traveling speed with full load is 11 miles per hour and the maximum gradium negotiated with full load 15 per cent. The vehicle is 20 feet in length and 6 feet 8 inches wide, the gauge being 18 inches. The four-cylinder motor has an output of 24-30 horsepower and is connected through chain transmission with the pump. The water tank is 11 feet 6 inches in length, 5 feet in width and 3 feet 6 inches in height; its capacity is 1,400 gallons. The output of the pump rotating at a speed of 1,400 per minute is 400 gallons per minute and its power consumption is 12.5 horsepower, as has been demonstrated in the trials.

When used as a sprinkler, the vehicle is able to deal at maximum speed with a street 53 feet wide and nearly 2,000 feet long, sprinkling it in a single run through out its width. When used as fire engine. a jet 100 feet in height, exclusive of the height of the hose, is readily obtained, which may be called a remarkable performance.

The Puch-Parsche sprinkler at the same time constitutes a street sweeper, hauling one or two sweeping machines and thus effecting simultaneously the sprinkling and sweeping.

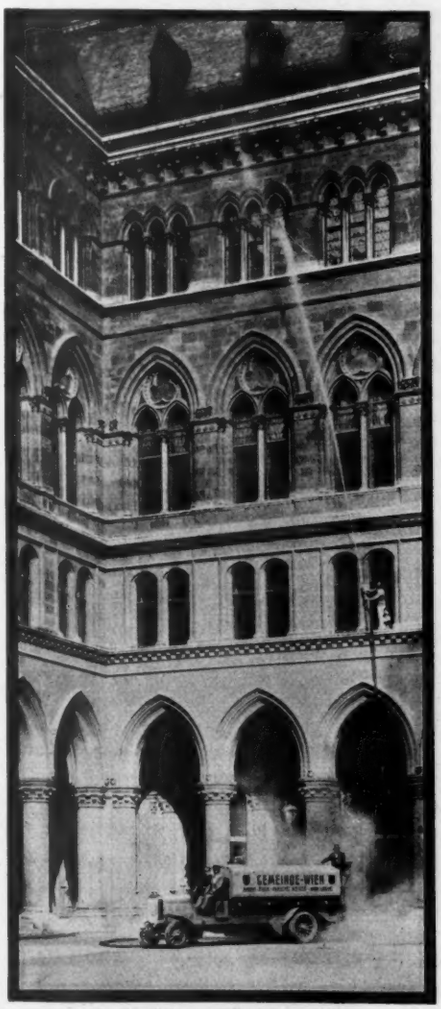
The vehicle also is a load van and tractor suitable for many uses. Whenever there is no need for sprinkling, the tank and pump can be readily replaced by a body corresponding to a given effective load. In this quality the car will convey an effective load of 6 tons and when used in conjunction with a trailer, even 10 tons. Another possible use is for washing and rinsing cab stands, etc.

The Puch-Parsche sprinkler can be fed from any source available. As in fact the pump is a combined pressure and suction pump, the tank can be supplied under its own power from creeks. As the traveling speed with empty tank is about 20 miles per hour, the vehicle is well fitted to serve as rescue car for emptying flooded rooms, etc. An important feature is that the car only requires the services of one attendant, which greatly reduces the cost of operation.

the timing gear housing, with the plugs in the center of the cylinders and not in the valve pockets. The motor is set well back on the frame, leaving a considerable space between it and the radiator, and that the cooling is by pump without the use of a fan, and without flywheel vanes.

One of the features of the motor is the design of crankcase and gearbox, the two being bolted together to form one unit, and completely filling up the space between the two side members so as to avoid the use of an underpan. The frame has but three cross members: one under the radiator, one at the extreme rear, and one level with the rear spring hanger. At the front the flanges are extended inwards so as to receive the crankchamber, which is bolted along its whole length, leaving no gap between motor and frame. The lower portion of the case carries the three main bearings, and even when the motor is entirely dismounted this need not be disturbed. The upper portion, carrying the camshafts, timing gears, pumps, etc., is mounted on the lower half, and the block of cylinder above this in the usual way. Thus to get at the main bearings the cylinders would first be taken down, then the upper half of the crankcase. The gearbox has arms encircling the flywheel of the motor and forming a pan under it, and is bolted at the fore end to the crankchamber; at the rear its two arms rest on and are bolted to the frame members. By this arrangement everything from the radiator to the rear of the gearbox is protected from mud and dust.

The firm makes use of its own carbureter, which is a three-jet type with mechanical air control. As the three jets are successively uncovered additional air is admitted, and for finer adjustment, and particularly for running in high altitudes, there is an additional air lever on the dashboard. Gasoline being under pressure, the carbureter is set high, and as a single bolt holds the float chamber and the three jets to the mixing chamber dismounting is very readily effected.



GERMAN TRUCK IN OPERATION
Combination fire engine and sprinkler throwing water in demonstration

Gasoline

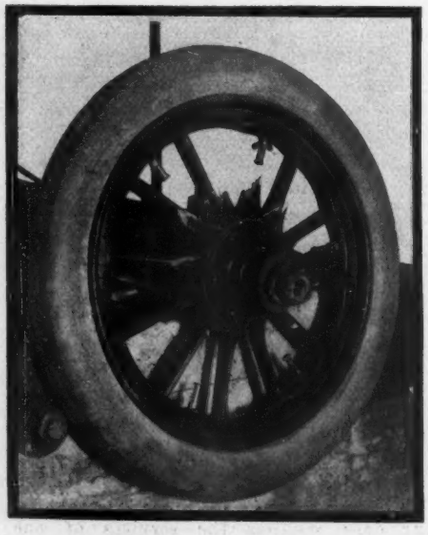
By Petroleum

Article III

WE know you have reached the point where you are asking, "If gravity is not a true test, what is?" We found ourselves asking this question long before we had progressed this far in our investigation. It seemed to us that the refiners must have some method of ascertaining whether or not a gasoline will meet certain requirements. There must be some reason why a 58-gravity Kansas gasoline performs the same as a 66-gravity Pennsylvania gasoline, and we shall now endeavor to cover this point; but before doing so, we shall have to apologize for being a little more technical than in our previous articles, and ask the reader's indulgence in this respect. The subject is strictly a technical one, and it is difficult to absolutely get away from the smell of the laboratory, but if we take up the subject in easy steps, the traveling will not be hard.

Gasoline Member of Naphtha Family

It should be borne in mind that while we are studying gasoline in its relation to its use in an internal combustion engine, it is used for a variety of other purposes; as a matter of fact, gasoline is known to the refiner simply as a member of the naphtha family. Let us introduce to you some of the other members. Here are the varnish makers' and painters' naphtha, the dyers' and cleaners' naphtha, the stove naphtha, the gasoline lamp naphtha, the lighting plant naphtha, the gas machine naphtha, the engine naphtha—this is the one we have been talking about—the pentanes and the hexanes, used for testing purposes, and so on through a long list. All of these belong to the naphtha family. All of them are more or less referred to commercially as gasoline and sometimes erroneously called benzine. Benzine, however, is a coal tar product.



RUDGE-WHITWORTH TEST
Effect of side slip against curb on wood wheel

The refiner knows and distinguishes each member of this family not by gravity, but by boiling points. He knows it would be impossible to make his goods uniform by using the fleeting standard of gravity, but knowing the boiling points, he can depend upon the quality of the goods.

It is not difficult to understand what boiling point means, for the expression explains itself. It is the point on the Fahrenheit thermometer at which a liquid will begin to boil. But the refiner does not stop here. He distills a given quantity of gasoline, and while it is in the process of distillation, ascertains at what point each 10 per cent will boil until the entire quantity is evaporated or distilled. In this manner is determined what is known as the initial boiling point, as well as the maximum boiling point and all intervening boiling points.

Most liquids will evaporate when exposed to the open air at any ordinary temperature. It takes some longer to evaporate than others. The rapidity with which a liquid will evaporate is determined by its boiling points. For instance, a liquid that has a low boiling point will evaporate quicker than one with a high boiling point—it takes less heat to boil it, that is, to cause it to go off in a vapor; consequently, it requires less heat and air to vaporize it. Now let's get this clear before we go any further.

Water boils at 212 degrees Fahrenheit; consequently, it will take it longer to evaporate than a gasoline that has an initial boiling point of, say, 115 degrees Fahrenheit. But water will evaporate quicker than kerosene oil with an initial boiling point of 325 degrees Fahrenheit. From this we see that the lower the boiling point the quicker the liquid will evaporate under ordinary temperature. The higher the boiling point the longer it takes, or the more air and heat it requires. Of course, any liquid will begin evaporating long before it boils. We will now try to see how this works in practice.

Varnish makers want a naphtha that dries slowly, so as not to crack the gloss. They consequently insist upon a product having high boiling points. The user of a gas machine wants a gasoline that evaporates quickly, so as to be rapidly converted into gas by simply pumping air through the gasoline. He consequently demands a low-boiling-point gasoline. Neither of these products would be suitable for the other purpose; in fact, they are the two extremes.

Best Fuel for Motor Use

Before we began this investigation we were of the impression that a gasoline which was suitable for lamps or stoves was also best for engine use; in other words, that a good gasoline was good for all purposes, and that a poor gasoline was not good for any purpose. Our idea was that if a gasoline would not work in a lamp or stove, that was sufficient evidence that it would not give satisfaction in an engine. The facts are that a gasoline that is entirely suited for one purpose and, consequently, a good gasoline for that purpose, would be entirely unfit for another; and reversing the proposition, the very fact that a gasoline would not give satisfaction in a lamp or stove might be the reason why it would give excellent satisfaction in an engine, because the conditions and requirements are entirely different. All this is determined by boiling points. While it is true that it is possible to get a gasoline that would give fairly good satisfaction for a variety of uses, yet it is equally true that the best results are obtained by using a product manufactured as to boiling points for a particular purpose.

Used for Various Purposes

But our interest centers more particularly in gasoline best adapted for motor use. What have boiling points to do with this? Everything. We want an engine to start quickly. Low initial boiling points tell the story. It evaporates or volatilizes quickly in cold weather and starts quicker. It is possible to produce from some crude oil, gasoline having as low boiling points and much lower gravity than is produced from other crudes. High gravity does not necessarily mean low initial boiling points, and unless we have low boiling points, there will be trouble starting a car, no matter how high the gravity is, so that for easy starting a certain percentage of low boiling points is absolutely essential. Given this percentage, it is just as essential that the other fractions show gradually rising and higher boiling points. Probably the higher the better, within certain limits, for it is from the higher boiling points that the greatest power is obtained. We will go into details as to this in our next article.

It is unfortunate, perhaps, that we cannot make this test for boiling points as easily as we can stick a stem in a hydrometer jar and obtain the gravity, for such a test would tell us the true conditions, and gravity, as we have seen, tells us nothing. But after all what do we care?

PREPARING FOR TOURISTS

Moline, Ill., Nov. 12—With a view of rendering better service to the transcontinental tourists, garage owners along the route through Illinois are showing remarkable

activity this fall in overhauling their places of business and getting them into condition for the early touring season next spring. The direct touring line through the state last season, it is estimated, was covered by nearly 600 overland tourists although the records at the toll gates across the Mississippi at Clinton show nearly 4,000 cars crossed going either way. The volume of business done in tires and supplies as well as in repairs and storage mounts to a good round sum and the dealers along the route figure that with better garages and better accomodations the season of 1912 will exceed that of the past year.

At Wheaton, Ill., C. M. Ferry has opened up a larger and better equipped garage to care for the tourists and will carry next year a larger line of general motor supplies. At Geneva just across the Fox river bridge the Richardson garage was opened this season to supply the wants of the overland touring parties. Twenty-five miles further on at DeKalb, the next stop for the tourists, Clinton F. Cook has taken over the West End garage and installed a machine shop to take care of repairs and store cars and at the same time carries a full line of supplies.

At Rochelle, Ill., while there are three garages and repair shops an entirely new garage is being erected by C. A. Lazier on the site of the old Robert's garage. This new building will be 66 by 74, one story and fireproof in every particular. A shop 66 by 24 will be fitted with machinery able to take care of any sort of repair job. The building will be steam-heated from a plant in the basement while a modern compressed air plant will be installed with hose leads to the side walls for tires etc. At Dixon, Ill., Joe Miller's garage, one of the best known in the state, a shop 50 by 30 has just been completed above the garage which will give 1500 square feet below for car storage and transient accommodations.

At Sterling, the Sterling garage just completed for the sole purpose of catching the overland trade, furnishes the best accommodations at the present time for the tourists. Located one block from the hotel the new garage has already taken care of nearly every car which has come through this fall. The Morrison garage at Morrison will be enlarged to cater to the wants of the tourists who make their first stop at that point coming from the west.

At Clinton, Iowa, the Clinton Auto and Supply Co. garage because of its location just after crossing the bridge and getting into the city gets all the tourists trade, a large addition has been made in order to take care of the number of cars which at times during the past season necessitated the use of the large yard for the storage of transient cars.

Extending into Iowa all the way to Omaha the garages are enlarging their quarters and in nearly every little town through which the transcontinental route pass garages are being built or enlarged because to the choice business which comes to them from the overland travelers.

Manufacturers' Communications

BLITZEN BENZ IGNITION

ANDERSON, Ind.—Editor Motor Age—We notice in the Readers' Clearing House section of Motor Age, issue November 2, a description of Burman's Blitzen Benz. In this article, which is the answer to a subscriber's question, it is stated that "two magnetos are used with a complete ignition for each, there being one plug in each cylinder for each system, making two plugs in all."

We wish to correct this statement, which is undoubtedly a mistake, as the Blitzen Benz, as now equipped, and has been since Burman began to drive it, is fitted with one double-distributer Remy magneto. The double distributer fires two plugs in each cylinder in series giving absolutely simultaneous ignition. Doubtless Motor Age's information is based on the ignition equipment of the Blitzen Benz before Burman began to drive it. At that time it was equipped with two magnetos and had the arrangement as given in Motor Age. However, when Burman broke all world's speed records in the trials on the Daytona beach in Florida last winter he employed the Remy double-distributer system.—F. E. Moskovics, Remy Electric Co.

CARE OF TIRES IN WINTER

New York—Editor Motor Age—This is the season of year when a great many motorists are preparing to lay up their cars for the winter, and in order to aid them in putting the tires away properly, the service bureau of the United States Tire Co. has issued instructions on this point. It says:

When you lay up your car for the winter, remove the tires. First wash them carefully with soap and water, and then wrap them in strips of paper or cloth. Store them in a dark place, which is kept as nearly as possible at a temperature of 50 degrees. If the tires are to remain on the wheels for a considerable length of time when the car is out of service, jack up the wheels and leave only about 5 pounds of air in each tire. This keeps the tubes in shape and also keeps them soft and pliable. When the wheels are not jacked up and the car is allowed to stand for any length of time, the tires should be kept well inflated and the car moved occasionally, so that the tires do not flatten from standing too long on one spot.—United States Tire Co.

MOVING RUMOR DENIED

Detroit, Mich.—Editor Motor Age—We regret to have to report that the rumor has gotten out that we are planning to move our plant from Detroit to Indianapolis and make Indianapolis our headquarters. This rumor is very far from the truth as we have no idea of giving up our plant in Detroit, and are at the present time expending over $100,000 in the construction of new buildings at our Detroit plant. We are considering the matter, however, of establishing a branch in Indianapolis to help us in taking care of our Indianapolis customers. Detroit, however, will continue as before to be our headquarters, and is where the greatest part of our output will be built.—Hayes Mfg. Co.

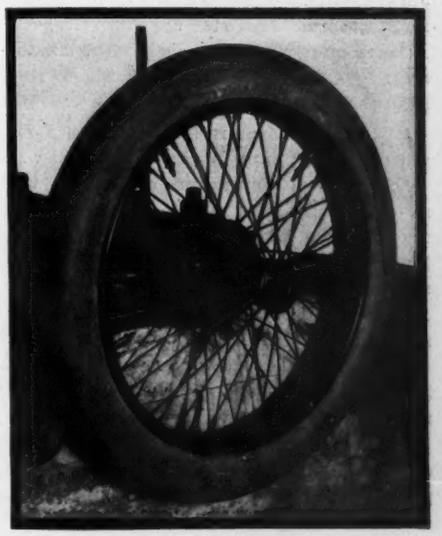
COMPARING WHEEL STRENGTH

Coventry, England—Editor Motor Age—Testing wheels by impact pendulum is carried out by Rudge-Whitworth Ltd. as a means of ascertaining the abiilty of a wheel to stand up against the shock of striking a curb at the conclusion of a side slip. Here illustrated are two wheels that have had equal blows. It will be noticed that the wood wheel is so complete a wreck that probably the very weight of the car would cause a collapse and make the car roll over, while the wire wheel is only slightly out of true and would not interfere with the running of the car in the least.

There is a curious impression that wire wheels, while very strong against steady strain, are not much good against shock. These tests show that the Rudge-Whitworth wheel at any rate is quite able to take care of shocks that would wreck a car with artillery wheels. The table of deflections is not without interest:

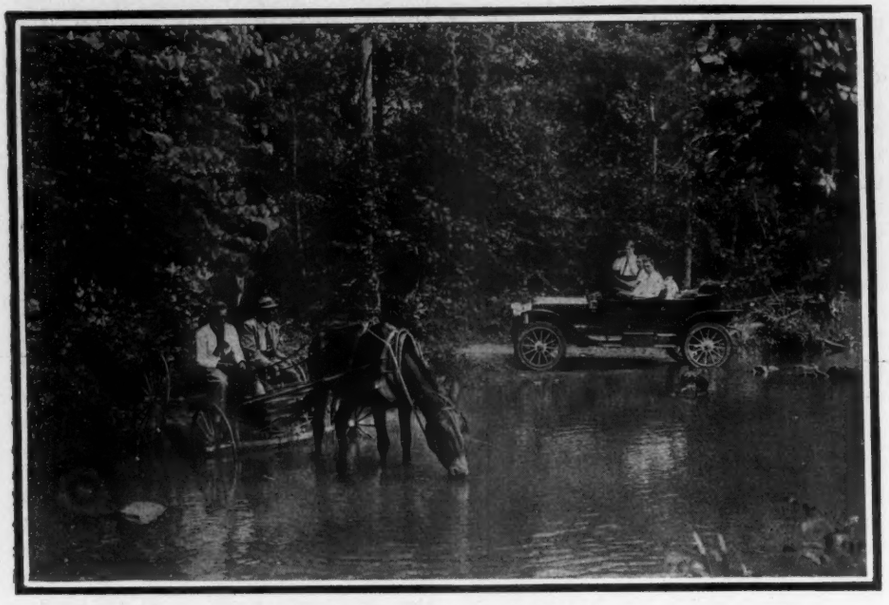
	Energy of Increment	*Blow Total*	*Deflection Wood*	*Wire*
1st	520	520	1"	¼"
2nd	610	1130	3⅝"	½"

Rudge-Whitworth, Ltd.



RUDGE-WHITWORTH TEST
Effect of side slip against curb on a wire wheel

Routes and Touring Information



FORD NEAR BARNSLEY GARDENS, GA.

A NORMAL man, on pleasure bent, would not normally pick out north Georgia as a touring ground. The great Appalachian range, after dwindling down into the Blue Ride peters out entirely in north Georgia and in doing so leaves a queer, knotty, hillocky country. It is not thickly settled or painfully prosperous and naturally one does not expect to find grand roads there—nor does one. But for all that, there are roads that are good enough, scenery that is more than picturesque and some of the quaintest, most entertaining country of all Dixieland.

More than local interest is being felt in tours out of Atlanta. This city is on the national highway, from New York to Jacksonville, over which the Glidden tour passed. Tourists are traveling to Atlanta more and more each year, making their headquarters there for short runs into the interesting surrounding country.

Not the least interesting of these 1-day trips from Atlanta is that to Rome, Ga., as quaint and picturesque a southern city as one would care to find. And to the lover of the unusual in architecture and landscape gardening this trip can be entertainingly varied by a visit to the famed Barnsley gardens, one of the south's most interesting ante-bellum estates. What makes the Barnsley place of exceptional interest is the fact that every brick in the huge house, every timber, the marvellous old range of the vintage of 1812, every shrub and tree on the place, every piece of furniture was brought by sailing ship from England in the early part of the last century, landed at Savannah and carried to Barnsley, more than 200 miles,

EDITOR'S NOTE—Motor Age wishes to announce that the Routes and Touring Department will be discontinued throughout the winter months. About 200 requests for routing in the states and Canada have been handled since March, and so popular has become the department that it has been decided to resume it at the beginning of the 1912 touring season for the benefit of those desiring information on routes or condition of roads.

Bit of England on National Pike

over roads that even now are none too good, by horse-drawn vehicles. Virtually it is a bit of transplanted England, set in the hill country of north Georgia.

The history of the place is almost without parallel in America. Godfrey Barnsley, who built it, left the Black Forest country of England back in the 30's and sailed to Savannah. He waxed rich in exporting cotton from Savannah but was at length forced to leave there because of the ill-health of his wife and sought the hill country. There he bought a 4,000 acre place from the Indians and started the construction of what was to be the finest country place in Dixie. Everything that went into the building of the house and the laying out of the gardens was shipped from England or the continent on returning cotton boats and at the time of the breaking out of the civil war not a private estate in America numbered greater art treasures. Unfortunately Barnsley lay in the line of Sherman's march. And when the camp followers moved on there was little left but the shell of a house, ashes, slashed pictures, marble fragments and desolation.

The trip from Atlanta to either Rome or Barnsley is worthy of a day's running just on its own account, leaving Atlanta over the wonderful oiled pike northward to Buckhead and then out the Marietta road to the Cobb county line. From this point on to Marietta there are roads of all sorts, some very bad, but these only troublesome for short distances. This is a 20 mile run, and an interesting one.

Then begins the second stage of the trip to Cartersville. The road loops first around a knobby little mountain and then straightens out, to a moderate extent only, through Kennesaw, Acworth, Allatoona, and Emerson to Cartersville. Going into Cartersville one passes many a unique

FAMOUS BARNSLEY GARDENS, A MINIATURE ENGLISH ESTATE IN GEORGIA

sort of excavation, an ochre mine. The entire countryside for a mile or so is yellow with this brilliant pigment.

Moving out of Cartersville the well-named Blue Ridge begins to loom up faintly to the eastward and the scenery is amazingly picturesque. Northward the road runs through Atco, Ferrobutte, Cars Station and Kingston. From there one leaves the beaten path, the railroads, the telephone poles and much of civilization and climbs over assorted roads in a direction slightly west of north to Barnsley.

Theoretically the Barnsley gardens have been closed to visitors, owing to the depredations of picknickers and assorted vandals, but the use of a moderate amount of blarney usually will gain admission to this treasure house of old-time relics.

From Barnsley to Rome is but a short distance and if one wishes to continue further there is fairly good going right to Chattanooga.

MEXICAN VILLAGE OF 1,000 INHABITANTS WHERE THERE IS NOT A BOARD HOUSE

FAYETTEVILLE, ARK., TO KANSAS CITY

Fayetteville, Ark.—Editor Motor Age—I have just taken a trip from here to Kansas City, Mo., through Johnson, Springdale, Lowell, Rogers, Bentonville, Centerton, Hiawassa, Pineville, Neosha, Carthage, Jasoer, Boston, Lamar, Irwin, Milo, Nevada, thence 1 mile west of Rich Hill through Butler, Adrian, Archie, Harrisonville. Motor 10 miles north to rock road from Harrisonville then on to Kansas City. From Fayetteville to Carthage it is 113 miles, where good hotel and garage accommodations can be secured; at Harrisonville, 123 miles from Carthage, there is also a good hotel and garage; Kansas City is 43 miles from Harrisonville. In dry weather there is nothing on this route to bother a motor car, but I would not advise anyone to try it in wet weather.

There are other routes through this section as follows: Bentonville, Gravette, Southwest, Grave, Afton, Miama, Baxter Springs, Galena, Joplin and Carthage. Also this same trip can be made as well from Nevada to Fort Scott, Pleasanton, Paola, Olathe and Kansas City; or another good route to the same section is to go from Miama to Colleyville, Cherryvale, Chanute, Iola, Garnet and Kansas City. While we have a route from Fayetteville to Fort Smith, it is a very rough one, and consequently not a good drive.

I am very much interested in the routes which Motor Age publishes, and I hope they will be kept up.—C. T. Harding.

FROM TOLEDO TO MARIETTA, O.

Pontiac, Mich.—Editor Motor Age—Will Motor Age kindly inform me through the touring pages the best route from Toledo to Marietta, O.? I want to make a quick trip when I start, and would like to go by way of Ashland, O., if the roads will permit a fair average speed; otherwise I will be willing to take another route.—Charles P. Webster.

The shortest route to Columbus is 132.7 miles, through Stony Ridge, Lucky, Pemberville, Bradner, Hatton, Mill Grove, Fostoria, Alveda, Carey, Crawford, Upper Sandusky, Little Sandusky, Marion and Columbus. The roads are good stone or gravel all the way. Another route is that of 142.5 miles through Perrysburg, Haskins Station, Bowling Green, Rudolph, Bays, North Baltimore, Van Buren, Findlay, Williamstown, Dunkirk, Kenton, Mt. Victory, Byhalia, Somersville, Marysville, California, Dublin, Marble Cliffe station and Columbus. This route is over level country and on good pike practically all the way.

The trip to Parkersburg, W. Va., is through a very pretty country over mostly good gravel or stone roads, with short stretches of good natural dirt, and is a distance of 112.7 miles. You will pass through Winchester, Lancaster, Rockbridge, Enterprise, Logan, Haydenville, Nelsonville, Sunday Creek, Circle Hill, Athens, Canaanville, Guysville, Coolville, Little Hocking, Parkersburg, Boaz and Marietta.

MOTORS TO GREGORY, S. D.

Beattie, Kans.—Editor Motor Age—I recently saw an inquiry for a route to Dallas, S. D., and I am giving herewith the towns through which I passed. We went north from Beattie to Branston, Neb., northwest to Wymore, thence to Beatrice, Lincoln, Wahoo, Freemont, Hooper, Westpoint, Stanton, Norfolk, northwest to Pierce, Plainview, Creighton and Niobrara. The roads were not bad this far, but we took the wrong road out of Niobrara and just north we encountered some bad hills, then got on the river bottom and in mud. We next traveled north and west to Lynch, where we struck good roads all the way to Gregory, through Spencer, Fairfax and Bonesteel. Our speedometer registered 411 miles from Beattie to Gregory and our car worked fine.

On the return journey we had dinner at Bonesteel, then went north and east and crossed the Missouri river at Wheeler. Between Bonesteel and Wheeler the range of hills and gulleys all around make it a picturesque drive. The road is fine until the Missouri river is reached, then there is a hill 1½ miles long. The river is crossed by ferry boat. From Wheeler we motored to Geddes, thence south and east through the Indian reservation. We spent the night at Lake Andes and then headed for Sioux City, and it was quite a sight to see so many artisan wells through that country. We reached Omaha and had good roads all along, then went through Lincoln for Beattie.

Our speedometer registered 950 miles; we had two blow-outs and two punctured tires. Our car is one which I use in livery business and it has been run 38,000 miles. —A. Driskel.

IMPROVEMENT ON NATIONAL PIKE

S. Brownsville, Pa.—Editor Motor Age—For the information of the tourists, I wish to say there has been a decided improvement made on the wharf on the east side of the Monongahela river at this place, which has to be crossed by ferry since removal of the bridge at this point a year ago. A brick pavement has been laid almost to the water line, so the difficult ascent is relieved to a great extent.

As this crossing is on the line of the old National road the absence of the bridge and dangerous condition of the east wharf has been a great annoyance, but by the efforts of our local motorists and others the paving of the wharf has been completed and through tourists can complete the trip by the pike without trouble at this point.—A. C. Smith, M. D.

LEAVENWORTH-ROSWELL TRIP

Leavenworth, Kan.—Editor Motor Age—Please give the best route from Leavenworth to Roswell, N. M.—not the shortest, but the best for cars to go this fall.—J. W. Sexton.

Motor to Kansas City through Lansing, Piper and White Church. The choice of two routes is offered you to Wichita, Kan.,

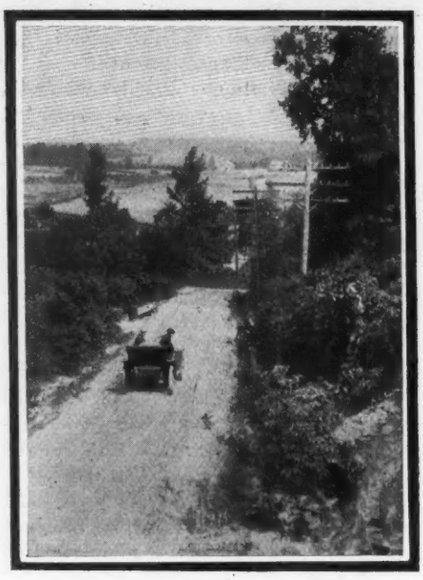
one being through Shawnee, Zarah, Monticello, Cedar Junction, De Soto, Eudora, Lawrence, Perry, Newman, Topeka, St. Mary's, Wamego, Manhattan, Ogden, Junction City, Chapman, Detroit, Abilene, Solomon, New Cambria, Salina, McPherson, Moundridge, Newton and Wichita; the second routing is Olathe, Gardner, Edgerton, Wellsville, Ottawa, Homewood, Ransomville, Williamsburg, Silkville, Agricola, Waverly, Emporia, Saffordville, Cottonwood Falls, Elmdale, Clements, Florence, Peabody, Walton, Newton and Wichita.

For Fort Worth, Texas, go to Peck, Riverdale, Wellington, South Haven, Drury, Caldwell, Renfrow, Medford, Pond Creek, Kremlin, Enid, Waukomis, Bison, Hennessey, Dover, Kingfisher, Okarche, El Reno, Minco, Pocasset, Chichasha, Verden, Anadarko, Apache, Lawton, Emerson, Randlett, Burkburnett, Wichita Falls, Jacksboro, Weatherford, Annetta, Aledo, Ben Brook and Fort Worth. Continue through Ben Brook, Aledo, Annetta, Weatherford, Mineral Wells, Palo Pinto, Breckenridge, Hamby, Abilene, Merkel, Trent, Sweetwater, Roscoe, Loraine, Colorado, Westbrook, Iatan, Coahoma, Big Springs, Stanton, Midland, Odessa, Y-ranch, Grand Falls, Great Falls and Pecos City, where you will be obliged to secure directions for Roswell.

Around Big Springs and Midland there is some bad sand. From Dallas the route follows the railroad, there being a few detours necessary to get through.

OVER MOUNTAINS OF OLD MEXICO

Monte Christo, Tex.—Editor Motor Age—After reaching the Texas-Mexican border at Brownsville and going through the necessary red tape to make a journey into the jungles of the revolution, we took 85 gallons of gasoline, cylinder oil, provisions, etc., aboard old Huldy, and she rivaled the Mexican burros. When we rolled into



TYPICAL GEORGIA ROAD

Jack Frost Is Foe To Be Feared in Winter

Various Schemes Are Adopted for Preventing the Freezing of Water System—Robe Placed Over Radiator while Car Is Standing Still Will Retain Heat, while Another Idea Is to Disconnect the Fan Belt—Machines Kept in Cold Places Can Be Protected by the Use of Anti-Freeze Mixtures—Wood Alcohol a Good Solution, while Other Combinations Include Calcium Chloride and Water, and Glycerine and Water—Still Another Is Alcohol, Glycerine and Water—How to Mix Them Properly

GREAT care should be taken to prevent the freezing of the water in the cooling system of the water-cooled motor car during cold weather, and a few hints on how this may best be done may be appreciated at this time. There are many motorists who store their cars in a warm garage over night, and leave their motors run to prevent freezing while the car stands out in the cold during the day. Others stop their motors when leaving the car standing out in the cold during the day, but cover the radiator and as much of the hood as possible with a lap robe. Both of these methods are effective providing the motor does not stop, in the first case; or the robe blows off in the second.

There are many cars in service in the city that are driven by chauffeurs, and which are rarely required to stand out in the cold for any length of time during very cold weather, and drivers of these cars have developed the habit of simply removing the fan belt so as to render the fan inoperative, or of placing a sheet of paper in front of the radiator, using the suction of air through the radiator to hold the paper in place. By doing this, the heat and consequent power efficiency of the motor is maintained, and by keeping the motor running while the car is standing still, freezing is prevented.

Many motorists keep their cars in unheated garages, and unless anti-freezing solutions are used in the cooling systems, it becomes necessary for them to drain the water from the cooling systems each night. In draining a cooling system one should be careful to see that all of the water is removed; and if the lowermost portions of the water pump or cylinder jackets are not provided with drain cocks, it is advisable to fill the system with a cooling agent that will not freeze, and consequently not require draining. If the water in the cooling system of a car is allowed to freeze, the water jackets of the cylinders and the tubes of the radiator will crack, while if the water in the pump is frozen, the shaft will be broken when the motor is started. It is possible for Jack Frost to do a couple of hundred dollars worth of damage to a motor in a comparatively short time.

There are several solutions which have been in common use in the cooling systems of motor cars for several years, and a resume of these may be appreciated by those that are not already prepared. The most widely used and easily obtained preparations are those of wood alcohol, glycerine and calcium chloride in water. Most popular among these is the alcohol solution, then comes the glycerine and alcohol preparation. The glycerine and calcium chloride solutions, though not so popular, have a large following.

Wood Alcohol Solution

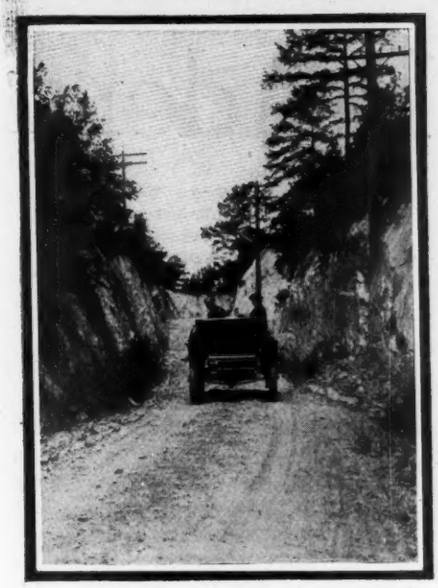
The wood alcohol solution is usually preferred because it is clean, does not damage the metal of the waterjackets or radiator, and has no deleterious effect upon the rubber hose connections, its only fault being that it evaporates very readily if a motor is inclined to run warm. It can be used in either large or small quantities according to the occurrent drops in temperature of the latitude in which it is employed, and the following table will give a fair idea of what may be expected of the various proportions of the mixture:

Percentage in water	Freezing point
10	18
20	5
25	—2
30	—9
35	—15
40	—24

To make clear the meaning of these figures, taking for example the first figures, 10 under the heading of percentage in water would mean that ten parts of alcohol should be mixed with ninety parts of water. This would prevent freezing at temperatures as low as 18 degrees above zero. The last figures would mean that forty parts of alcohol with sixty parts of water would insure the solution against freezing at 24 degrees below zero. In general the 25 per cent solution will be sufficient for all ordinary occasions. In many cases one filling of the radiator with an alcohol solution will last throughout the entire winter; but should any loss of radiator supply occur it should be replaced with equal parts of alcohol and water.

Calcium Chloride and Water

Calcium chloride $CaCl_2$ is a very effective cooling agent, but unless the chemically pure article is used there is danger of corrosion of the metal with which it comes



EN ROUTE FOR BARNSLEY GARDENS

the ferry boat to cross the Rio Grande into Matamoras some natives were in line to drag us up the hill, as they said they did all other cars, but we made the climb without their aid. The Mexican custom officers then were treated to a little spin around town before leaving for the jungles.

In the afternoon of the first day's drive we made 85 miles, just reaching the mountains for supper. All went well, and early next morning we tackled the mountains, where our real fun began. For days there was not even the sight of a wagon to guide us, for the freight is all carried on the backs of mules.

Near Tampico game was very plentiful, but there were most too many tigers to make us feel easy. We saw parrots by the score, and had turkey, venison and fish on the entire trip. Just as we were beginning to enjoy ourselves some heavy rains in the direction of home put us to flight. There were several bad streams between us and home, so at the first sight of rain we decided to travel day and night until all of these streams were crossed, even the Rio Grande. The mountain streams were wild, but on we went slipping along, making pulls that seemed utterly impossible. Seeing is believing, and if you want to know how good a car is, just try it in a country where there is not a shop, not a place for repairs, not even a gallon of gasoline for hundreds of miles, nor a team to pull you out of the mud and up the hills.

When we reached Matamoras and came in sight of old Texas again, we summarized a bit. We traveled 600 miles over rocks and stumps and never hit a one,—200 miles of mud and not stuck yet,—300 miles from any cylinder oil with only 1 gallon of pure leaf lard—and did not pump a tire nor use the wrench on the entire trip.—W. I. Davidson.

But Motorists Know How To Foil Him

in contact. Crude calcium chloride retails at about 8 cents or 10 cents per pound, and is to be avoided, but the chemically pure article required costs about 25 cents a pound when bought in small quantities. A solution of 5 pounds of calcium chloride to each gallon of water will not freeze at any temperature above 39 degrees below zero. The following table will show the proper proportions of a calcium chloride solution for the different temperatures:

For each gallon of water	Freezing point
1 pound	27
2 pounds	18
3 pounds	—1.5
3½ pounds	—8
4 pounds	—17
5 pounds	—39

The best way to make this solution is to make what is called a saturated solution, then add water to it until the required mixture is obtained. To make a saturated solution mix with a quantity of water warmed to 60 degrees Fahrenheit all the calcium chloride the water will dissolve. If chemically pure calcium chloride is used no trouble will result, but chloride of lime, $CaOCL_2$, often sold as pure calcium chloride, should not be used. It has been advised that a handful of lime be added to this solution to render it alkaline. This is done to prevent an acidic action of the solution on the metals and its consequent setting up of electrolytic action.

Glycerine and Water

Glycerine is an effective cooling agent and as it will not crystallize in the water-jackets it is preferable in this respect to calcium chloride, and it has the further merit of not requiring any renewal during the season as it does not evaporate. It therefore is necessary only to add pure water to replace that which has evaporated. As with the other solutions, there are several solutions of glycerine and water for different temperatures, which are as follows:

Percentage in water	Freezing point
10	28
30	15
40	5
50	—2
55	—10

These solutions have been known to work very well indeed, although it is true that glycerine does affect the rubber hose connections but not so rapidly as to become over-troublesome. In using the glycerine solution care should be taken to thoroughly cleanse the jackets of any residue of crystals from calcium solutions previously used, as this residue will thicken and clog the glycerine solution and render it partially ineffective. Solutions of glycerine will thicken up when subject to low temperature but will not solidify, and where there is no solidification there is no disruption of the piping of the radiator or of the jackets of the cylinders. The slush formation of a glycerine solution passes through a water pump with apparent ease, and as this is probably the most constricted point in the system the circulation is not noticeably impaired. If a system gets hot with a solution of this kind it is the water that boils off and to replace it is all that has to be done, for about three months at a time. Should the solution, after a time, lose all semblance of its original balance, to start over again with a new solution is the wisest course to follow if one would be on the safe side.

Alcohol, Glycerine and Water

Since either alcohol or glycerine added to water will lower the freezing point, it has been found that combined they would do the same thing, each in its proportion to the water present. They form no chemical combinations but are merely mechanical mixtures. Assuming that the wood

WINTER HOOD FOR RADIATOR

alcohol is to be preferred because it is less liable to choke up the constricted passageway or attack the hose connections, and outside these evils, which are characteristic of a glycerine and water solution, it is a most desirable and substantial mixture; then it is well to consider the advisability of reducing the quantity of glycerine and substituting alcohol instead. By the use of both alcohol and glycerine the total proportion of water can be increased and this is a step in the right direction as the cost is decreased and the stability of the mixture increased. Combinations of alcohol, glycerine and water are very satisfactory. The following combination is half alcohol, half glycerine and water:

Percentage in water	Freezing point
10	25
20	15
25	8
30	—5
35	—15

AGAINST HIGH PARTS COST

Reader Suggests Remedies for Excessive Cost of Repair Parts

DUBOIS, PA.—Editor Motor Age—The excessive charges for car parts is becoming a great question with the owner today. Three manufacturers just last week raised in their prices, one 50 per cent, another 20 per cent, while the third has only announced a raise. The cost of making these parts is continually growing less, but to the buyer the price increases as the cost decreases. Upon investigating the prices, we find that to buy a car piece by piece it would cost seven or eight times as much as the car, although the maker misses the cost of assembling and testing. I was looking over some cars of one make the other day when I discovered that such parts as axles, shafts, transmission, wheels, etc., were made interchangeable for the four and six-cylinder models. I was surprised upon looking at their price list to see the charges on these same parts in the six were one-half again as much as were quoted for the four. This is not just to the owner and in the long run will come back and be a detriment to the sale of these cars.

There are only two remedies for this abuse that I can see: one being to give figures and names of cars making excessive charges in magazines, but for very good advertising reasons the magazines could not publish them. The other would be for the buyer before purchasing a car to procure a parts list and investigate it, being very careful not to count parts twice, or leave out such things as frames, tires, and electric fixtures which are seldom quoted. In this way a manufacturer would soon see his error, for very few will buy a car which will cost him excessively to operate. No car is free from breakage or replacement, and it is generally the rule cars charging most have the most breaks.

A man wanting to buy an engine for his business will go into the question with a great deal of intelligence, and will thoroughly investigate the economy, etc. Then why should this same man when buying a pleasure car go about it as if blindfolded to all but the first or present cost? He is paying money for the car to get pleasure and he is paying money for the engine in his business to manufacture his goods. Why shouldn't he look just as closely after the profits in his pleasures as he does the profits in his business?

Factories are now boasting of their service systems and most of them are free to boast. A short time ago I looked over a car which had just been overhauled at a well known factory, which boasts of its service system, and sells no car under $4,000. The car was driven there through the mud, and upon going for it 3 weeks later found the same mud still on it. Instead of cotter pins being used, a piece of copper wire was twisted around bolt ends. Transmission was not bolted to the frame, and a piece of gasket being left in the carbureter caused it to flood very badly. If this is what factory service system is, I don't see anything to boast of.—W. J. Marlin.

The Readers'

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired

HARD STARTING IN WINTER

Burns, Kans.—Editor Motor Age—I have a 1912 model T Ford, and I have trouble starting it in cold weather until it has become slightly warmed up. It is fitted with a Kingston master vibrator coil and Kingston carbureter. All contact points and the high-tension part have been removed and cleaned. The motor seems to work perfectly after it is started, but it requires priming and sometimes batteries to start it. The carbureter works perfectly after it is started. Will Motor Age inform me what is the trouble, and give me the remedy?—W. F. Walter.

This is quite a common trouble in winter and is due to the fact that the gasoline does not vaporize easily when cold. The Standard Oil Co. makes a specially light grade of gasoline, which if used during the winter months usually pays for the higher cost by the less difficult starting.

Starting can be facilitated by holding a cloth soaked in gasoline over the air intake. A few drops of ether on a sponge

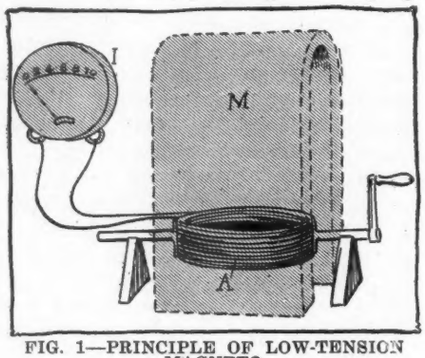


FIG. 1—PRINCIPLE OF LOW-TENSION MAGNETO

gives still quicker results. It would seem that your trouble is entirely due to slow vaporization of the fuel. You will find this phase of the fuel question discussed in the series of articles entitled "Gasoline," which is running in Motor Age.

TWO-CYCLE AND FOUR-CYCLE POWER

Lewistown, Ill.—Editor Motor Age—Through the Readers' Clearing House will Motor Age explain the difference in power of two motors: one a two-cycle, three-cylinder, 4 by 4 motor; the other a four-cycle, four-cylinder, 3¾ by 4-inch motor? What is the horsepower of both motors at the same number of revolutions per minute?—Owner.

One of the widely used formulas for rating motors is stated as follows:

$$H.P. = \frac{D^2 \times L \times N \times R}{C}$$

where D is the cylinder bore in inches, L is the stroke in inches, N the number of cylinders, R the revolutions per minute, and C a constant which is 12,000 for four-cycle motors and 13,500 for two-cycle motors.

According to this the four-cycle, four cylinder motor is rated at 15.2 H.P., and the three-cyclinder, two-cycle motor at 14.2 H.P., assuming an engine speed of 1,000 R. P. M. for both.

SUGGESTS REMEDY FOR LEAKY TOPS

Lyndon, Ky.—Editor Motor Age—More than 1 year ago my mohair top began leaking, and after being told by several people that there was no cure for it except to get a new one, a balloon friend suggested using balloon makers' oil, the trade name for which is triple boiled linseed oil. I gave the top two coats, and it has not leaked a drop since. It also improved the looks of the top very much. I hope this suggestion may be of benefit to the readers of Motor Age.—C. W Fowler.

HOW A MAGNET WORKS

Chicago—Editor Motor Age—Through the Readers' Clearing House will Motor Age tell briefly how a magneto makes electricity.—L. Homan.

It is an elementary principle of electricity that if a loop of wire is moved in a magnetic field—that is, near the poles of a magnet—a current of electricity will start to flow through the wire. The greater the number of loops in the wire, the faster it is moved and the stronger the magnetic field, the greater will be the current.

A very simple magneto is shown in Fig. 1 in which M is the horseshoe magnet and A the coil of wire between the poles of the magnet. The coil is arranged to be revolved and thus becomes the armature of the magneto. When the coil or armature is rotated by the crank the current indicator I to which the ends of the wire are connected, will show that there is a current flowing in the wire. Further, the direction of the current will be reversed twice in every revolution of the coil, as the strength of the field changes. The current generated by a magneto of this type is low in voltage, and in order to increase the pressure or voltage to a point where it will jump the gap in a

Clearing House

EDITOR'S NOTE—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated

spark plug, the current is sent through an induction coil which acts as a transformer. Magnetos in which the current is generated at this low voltage are called low-tension magnetos.

In other magnetos the extra induction coil is dispensed with, the current being stepped up by a transforming action that occurs in the magneto armature itself. Such magnetos are known as high-tension magnetos. The arrangement of a simple high-tension magneto is illustrated in Fig. 2. It will be seen that the armature consists of two separate coils, in one of which P, called the primary, a low tension current is generated just the same as in A of Fig 1.

Around the primary coil P is wound a secondary coil S consisting of many turns of fine wire. If it be connected at its ends to the indicator I when the armature is revolved, a high voltage will be shown. Since the voltage in the secondary depends upon the rapidity of the change in the voltage of the primary, a device called a circuit breaker is employed to cause the changes to be more abrupt than they would normally be. In Fig. 2 the simplest form of circuit breaker is shown. One end of the primary coil P is grounded on the armature shaft at G while the other end is connected to the contact brush C. This bears in a metal disk on the shaft but having an insulating segment as shown. In this way the current is made and broken very rapidly in the primary coil of the armature. In order to increase the action in the coils of both types the coils are wound on a core of soft iron wire.

KEROSENE AS AN ANTIFREEZE

Champaign, Ill.—Editor Motor Age—Through the Readers' Clearing House kindly discuss the advantages and disadvantages of using kerosene as a cooling agent in cold weather, that is, draining off all water from the radiator and using kerosene only.—E. J. Bartz.

The advantage in using kerosene as a cooling agent is that you will have no difficulty with freezing in cold weather. The only disadvantage that accompanies the use of this cooling medium is that the rubber hose connections may have to be replaced before the winter is over as the kerosene rots the rubber. It is claimed that the connections will not be affected by the kerosene if they are previously dipped in shellac. This would seem to remove the only objection to the use of this non-freezing cooling agent.

In addition to kerosene there are a number of other solutions employed such as a mixture of alcohol and glycerine, as given below; and calcium chloride, as outlined in another department of this issue.

ANTI-FREEZE MIXTURES

Cave Springs, Ga.—Editor Motor Age—Kindly advise me through the Readers' Clearing House a good anti-freezing mixture for a big water tank of a stationary gasoline engine.—Albert N. Tumlin.

The mixtures given below are safe for stationary engines or motor cars, and are not expensive. Either denatured alcohol or wood alcohol may be used with commercial glycerine. The preparations given will make 5 gallons of solution, and it is advisable to keep a quantity on hand for instant use:

Will not freeze at 15 degrees above zero:		
Water	4	gallons
Alcohol	½	"
Glycerine	½	"
Will not freeze at 8 degrees above zero:		
Water	3¾	gallons
Alcohol	5	pints
Glycerine	5	pints
Will not freeze at 10 degrees below zero:		
Water	3 gallons, 1	pint
Alcohol	1 gallon, 1	quart
Glycerine	2 quarts, 1	pint
Will not freeze at 20 degrees below zero:		
Water	1 gallon, 1	quart
Alcohol	2 gallons, 2	quarts
Glycerine	1 gallon, 1	quart

MAKE MOTOR STARTERS

Chilton, Wis.—Editor Motor Age—Through the Readers' Clearing House will Motor Age answer the following questions:

1—Give me the names of manufacturers of compressed air motor starters?

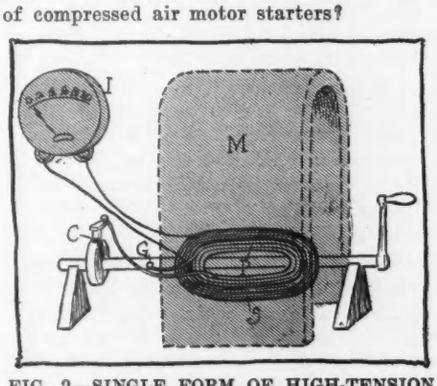


FIG. 2—SINGLE FORM OF HIGH-TENSION MAGNETO

2—Acetylene gas motor starters?

3—Mechanical engine starters?—N. J. Knauf.

1—Wilson Starter Co., Franklin, Pa.

2—Ignition Starter Co., Detroit, Mich.; Prest-O-Lite Co., Indianapolis, Ind.

3—American Ever-Ready Co., New York; Gardner Engine Starter Co., Chicago, Ill.

COST OF MOTOR CAR REPAIR

Owner Gives Makers a Tip on Keeping Customers Satisfied

Clyman, Wis.—Editor Motor Age—The subject of the excessively high charges of motor repair parts in Motor Age has been timely and interesting. It is true that repair parts for nearly all machinery, as a rule, are of higher cost to the owners and users than its first cost was, already placed in the new machine.

Sometimes the price the manufacturer has set on it is three to ten times its actual cost plus 20 per cent as a factory profit. I remember an instance where a man had two piston rings broken. He wrote to the factory for prices because the local garage man did not represent his car. He soon received a reply by mail from the factory quoting the two piston rings at $1.25. But before he sent his money to the factory he inquired of the local machinist, who told him he would make three rings for $1.25, and of course he got the job, and the owner of the car received the extra ring cheap and saved 15 cents express charges besides. If manufacturers would meet the conditions and study them, they will find themselves winners in many ways. This high cost of repair parts keeps many would-be owners from buying a car, and if they buy it may make them the much-talked-of dissatisfied owners. Then, again, if the owner has a friend who is a machinist he may induce him to make a duplicate of a worn or broken part of a patented device or part of the machine, regardless who may be the holder of the patent.

Manufacturers, look and study the advertising columns of Motor Age, or any motor car journal, and you cannot help but notice the number of small shopmen who are ready to make parts as cheap as the manufacturers, or they could not exist.

There is another bill the purchaser of a car must meet, indirectly of course, and that is windy advertising. I believe in plain and honest advertising and plenty of it. Tell the public the truth in regard to what part is made in its factory and what is bought from firms partly assembled. The manufacturer should not forget that many firms make a specialty, such as car frames, gearsets, rear axles, engines, steering gears, etc. There are many motor car manufacturers who claim they build a certain part of their cars and so state in their catalogs, and also in their advertisements, in bold letters, when, in fact, they have jobbed with another maker for these parts. To illustrate: Two owners of new cars met in a little town and while they were going over the good points of their cars one of them made the remark: "Bet your frame is not made by that firm." The other insisted that it was because it was so stated in the catalog. "That don't matter," the former said: "you will find the letters S. M. on the under side and very small at that." The owner looked and to his surprise they

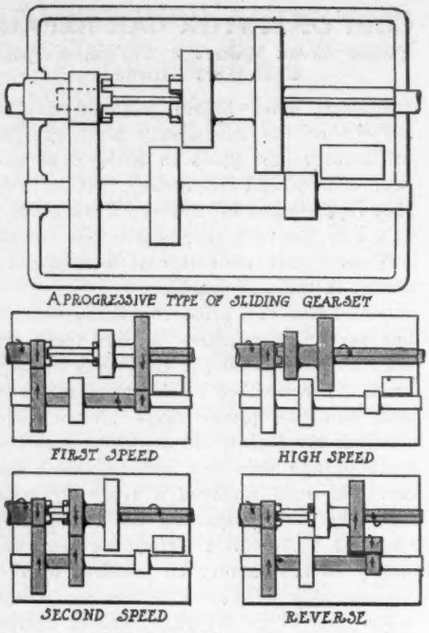


FIG. 3—COMBINATIONS OF GEARS IN PROGRESSIVE GEARSET

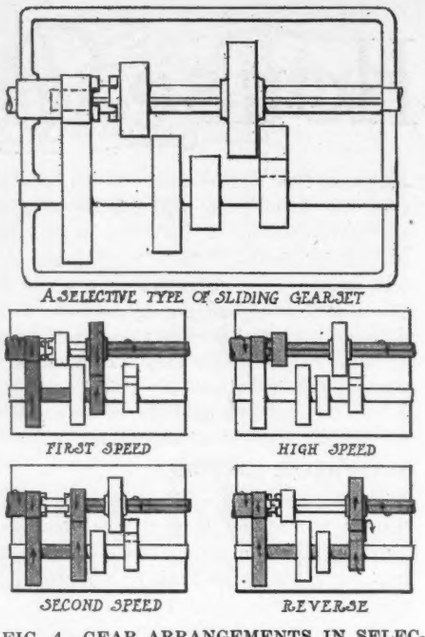


FIG. 4—GEAR ARRANGEMENTS IN SELECTIVE SLIDING GEARSET

were there and the new owner at once branded the manufacturer a liar because he had been deceived.—K. B.

TWO-CYLINDER CRANKSHAFTS

Denison, Ia.—Editor Motor Age—Through the Readers' Clearing House will Motor Age state which of the crankshafts, A or B, shown in Fig. 6, is used in a two-cylinder, four-cycle, upright gasoline motor, and state why one could not be used as well as the other?—Charles C. Kemming.

The crankshaft shape shown at A is correct for a two-cylinder vertical motor. Where three bearings are used the crankshaft may take the shape indicated by the dotted lines. With this arrangement there will be a power stroke once in every revolution; that is, at every 360 degrees of rotation.

The arrangement shown at B is incorrect for a two-cyclinder vertical motor, for the power strokes will not occur at regular intervals. The second power stroke will occur ½ revolution after the first, and the third 1½ revolutions after the second, the fourth following at the end of the next ½ revolution.

The crankshaft shape indicated in B is correct for a two-cylinder opposed motor, as shown at C. Here the impulses will occur at regular intervals.

TYPES OF GEARSETS

Brooklyn, N. Y.—Editor Motor Age—I noticed in the issue of August 17 A Reader asks if he can get more power out of a gallon of gasoline by using a muffler or by cutting it out. He is answered that at certain speeds back pressure is beneficial. In my estimation back-pressure in any engine is not desirous as it requires a certain amount of power to overcome this, which is wasted power. Am I not right?

I would also like to know how progressive and planetary transmissions differ from the selective which is the style 1 have had experience with.—Inquisitive.

In general, back-pressure is not desirous, for it requires power to overcome it. But such a condition as that mentioned in answer to A Reader, Dallas, S. D., in the Readers' Clearing House, August 17, is possible.

Gearsets are either planetary or sliding, and sliding gearsets may be either selective or progressive.

In the three views of Fig. 5 the principle and construction of a planetary gearset which gives two forward speeds and reverse, is illustrated. These illustrations are taken from Roger B. Whitman's "Motor Car Principles." In all the diagrams the pinion gear A is keyed to the engineshaft, the internal gear C is an integral portion of a drum which is loosely journaled upon the engineshaft and between the pinion gear A and the internal gear C there are four pinion gears B, in mesh with the gears A and C, that revolve on stubshafts attached to a spider or flange which is loosely journaled upon the engineshaft. The sprocket to which the driving chain of the car is attached is rotably attached to this spider or flange.

At the left is shown the direction of rotation of the various gears on low speed. The gear A revolves at motor speed in the direction indicated by the arrow upon it; the gears B being the same size, turn at the same speed in the opposite direction. The drum containing the internal gear C is held stationary; thus the spider or flange D, supporting the gears B, revolves in the same direction as the gear A, but as much slower as the difference between the number of teeth upon one of the gears B and the internal gear C.

Second or high speed is indicated in the center. By means of a clutch device, not shown in this illustration, the drum and gear C and the gear A are locked together, so that the gears B are held stationary between them, that is, they do not revolve on their own axes, but the whole outfit moves as a single compact unit, and the spider D revolves at crankshaft speed.

The reverse, at the right, comprises an entirely separate set of gears in which the drum carrying the integral gear C is connected to the driving sprocket, instead of the spider D, as in the set described above, and a means is provided whereby the drum supporting the gears B can be held stationary. Therefore, when the drum D is held stationary, and the gears A and B revolve as indicated by the arrows, the internal gear and its drum revolve in an opposite direction to the one on the engineshaft, and reverse speed is obtained.

A selective gearset is one in which the change from one speed to any other may be made without having to pass through the intermediate speeds. With a selective gearset a driver may shift from first to third without having to slide the second speed gears into mesh; or he may change from second to reverse without having to pass through first, etc. Most gearsets are of the selective type. In the progressive type of gearset it is necessary to engage the intermediate speed gears in mesh to pass from a higher to a lower speed or vice versa. Both are sliding gears, that is the gears are arranged to slide in and out of mesh with each other to bring about the different speed combinations.

In Figs. 3 and 4 two types of sliding gearset are illustrated, a selective and a progressive; and a study of the various speed combinations will reveal the difference between the two types.

DRAIN OUT THE GASOLINE

Poughkeepsie, N. Y.—Editor Motor Age—Will Motor Age tell me through the Readers' Clearing House the best plan to follow

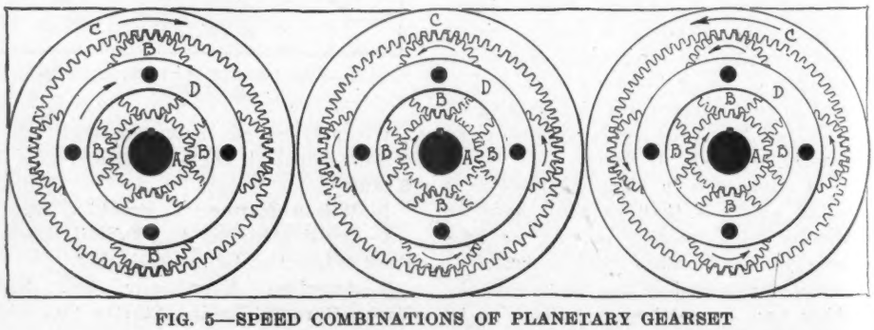


FIG. 5—SPEED COMBINATIONS OF PLANETARY GEARSET

in caring for the carbureter and looking after the differential gear when putting the car up for the winter months? I have an E-M-F car and the carbureter is adjusted exactly right. Would it be better to keep the bowl filled with gasoline during the winter, or would it be better to shut off the gasoline supply pipe and let the bowl thoroughly dry out? The differential on the car has never been taken down and at this time does not show any indication of wear, therefore, does Motor Age think it necessary to take the rear axle down and see in what condition the gears are?—L. P. Gillespie.

It is better both from a standpoint of safety and from that of economy to drain out all the gasoline from the entire system when the car is laid up for the winter. Let the gasoline out of the tank and carbureter and close it up in a tight can. Otherwise you will probably find when the car is put in service in the spring that the residue of fuel in the tank, if any remains, is of a very low grade. In standing over winter the volatile portions of the fuel will evaporate.

The differential should be looked after about once a year, and laying-up time is about the best time to examine it. You are referred to a special article on equipping the car for the winter which appeared in Motor Age October 26.

INTERESTED IN RACING MOTORS

Bridgeton, N. J.—Editor Motor Age—Through the Readers' Clearing House will Motor Age answer the following questions:

1—What are the cylinder dimensions of Burman's Buick Bug that raced at Jacksonville last March?

2—What are the cylinder dimensions of Disbrow's Pope-Hartford that raced at Jacksonville last March?

3—What is the mile record of the 300-horsepower Fiat? Has it covered 116 miles in 1 hour, and who is to drive it in America?

4—What is the size of the Brooklands track and of what is it made?

5—How many road races have been held at Lowell and what car won each?

6—What car is considered by Motor Age the speedway champion of 1910?

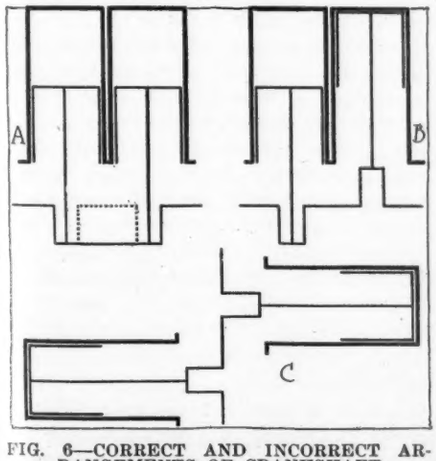


FIG. 6—CORRECT AND INCORRECT ARRANGEMENTS OF CRANKSHAFT

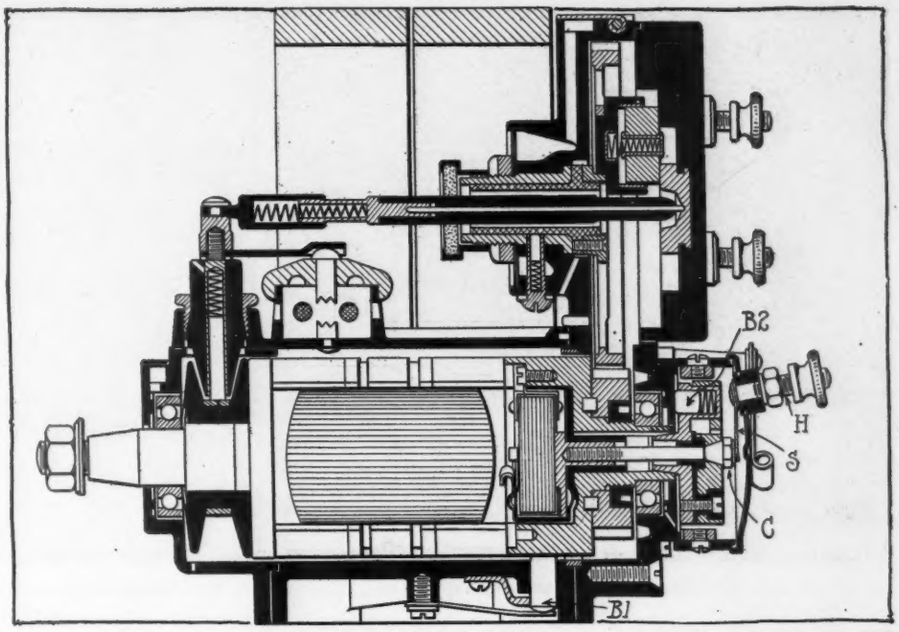


FIG. 7—SECTION OF BOSCH DU4 VARIABLE SPARK MAGNETO ILLUSTRATING CAUSE OF HUDSON MOTOR REFUSING TO STOP

7—Does Motor Age at the end of each year publish a review of the races for the year? If so, when will the 1911 record be out, and how much does it cost?

8—What is the formula for finding the cubic inches of an engine?

9—What is the Darracq agency in America?—C. M. Ogden.

1—The cylinder dimensions of the Buick driven by Burman at Jacksonville last March are: Bore, 6 inches; stroke, 5¼ inches.

2—Disbrow's Pope-Hartford had a bore of 4¾ inches and a stroke of 5½ inches.

3—The 300-horsepower Fiat has no official mile record. The reported 116 miles in the hour was not the actual distance covered, but the pace at which the big car covered ½ mile. It was expected the car would be brought to this country this fall, but so far it has not been sent across. David Bruce-Brown was to have driven it in races here.

4—The Brooklands track in England is 2¾ miles to the lap and is made of cement.

5—Lowell, Mass., first held a road race in 1908 which was won by the late Lewis Strang in an Isotta. In 1909 the national stock chassis championships were run at Lowell, the winners being George Robertson in a Simplex, Bob Burman in a Buick, Louis Chevrolet in a Buick and Billy Knipper in a Chalmers.

6—Speedway honors of 1910 were divided among the Marmon, National, Fiat and Benz, with Ray Harroun of the Marmon the best individual performer.

7—Motor Age annually publishes a review of the year's road races and will again do so this year immediately after the running of the road races at Savannah. In book form this review may be had for 25 cents a copy.

8—The piston displacement of a motor in cubic inches is found by multiplying the bore of the cylinder in inches by itself, then by .7854, then by the stroke of the motor in inches and then by the number of cylinders. It is usually expressed by the formula, PD = $B^2.7854SN$; where PD is the piston displacement in cubic inches B is the bore in inches, S is the stroke in inches, and N is the number of cylinders of the motor.

9—The American agency of the Darracq is the Darracq Auto Agency, 733 Seventh avenue, New York.

ON MAGNETO TROUBLE

In regard to the trouble of a subscriber, Little Rock, Ark., answered in the Readers' Clearing House, November 2, the Bosch Magneto Co. offers some additional suggestions as to the cause of the motor refusing to stop. These are in the nature of a correction, and an illustration, Fig. 7, is submitted to assist the explanation. The company says:

"The system that is used on the 1910 model 20 Hudson cars is the Bosch type DU4 model 4 variable spark magneto without batteries. The reason the motor fails to stop when the high-tension switch is in the "off" position probably is due to the fact that short circuiting cable leading from connection A, Fig. 7, on the magneto is missing or that the small blue steel spring S which presses on the center fastening screw C does not make proper contact.

"It may also be due to the fact that brush B2 right behind the contact breaker disk or the brush B1 in the bottom of the magneto base plate do not make good contact; in this case the spring must be stretched slightly so as to give firmer tension. Should it not be due to any of these either the switch is defective or the grounding cable from switch to the motor is lost or displaced."

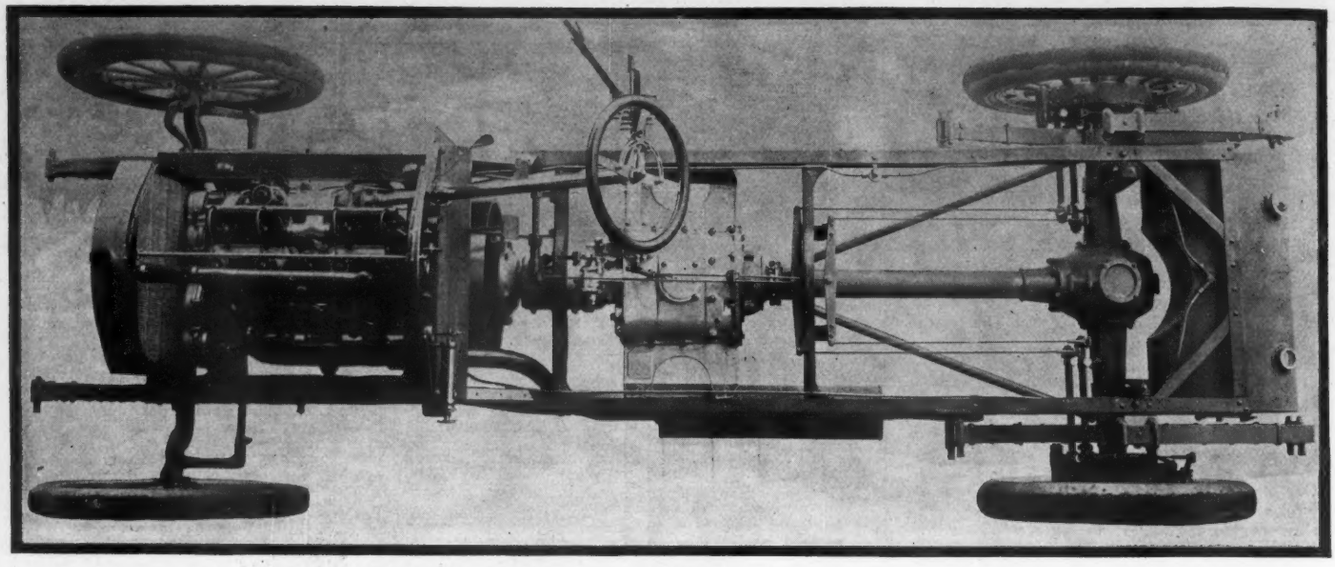


FIG. 1—THE SHAFT-DRIVEN SIMPLEX, WH ICH WAS FIRST BROUGHT OUT ALMOST 1 YEAR AGO

Long-Stroke Shaft-Driven Simplex Shows

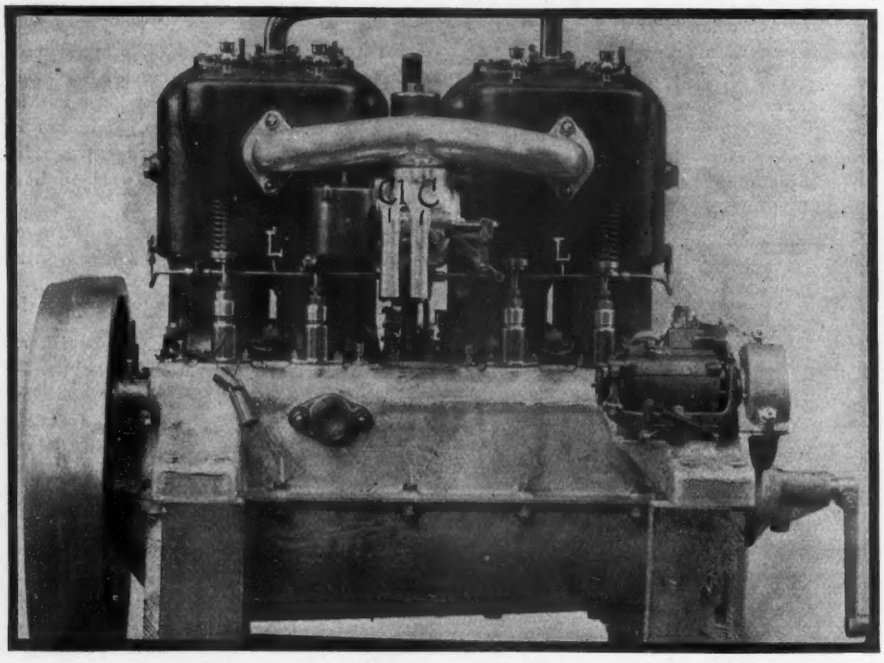


FIG. 3—CARBURETER SYSTEM IN SHAFT-DRIVEN SIMPLEX
A double-jet carbureter is employed on the shaft-driven model for 1912. The two air intakes, C and C1, are indicated with the float chamber at the left

FOR the second year of manufacture of its shaft-driven cars, the Simplex Automobile Co. offers the 38-horsepower chassis with very few changes from the design embodied in this year's product. The most important change lies in the design of the carbureter. The single-jet type, which was employed heretofore on both the chain and shaft-driven models, is replaced in the shaft-driven chassis by a multiple-jet type, although the former design is still employed on the chain-driven models. A more noticeable alteration is the lengthening of the wheelbase by 10 inches.

The power plant of the shaft-drive Simplex is of the two-unit type; the clutch is a unit with the flywheel of the motor and the gearset is separate. The motor has four cylinders cast in pairs. The cylinders are of the T-head design with the exhaust valves on the left and the inlet valves on the right-hand side. The diameter of the cylinders is 4⅞ inches, giving the motor an S. A. E. rating of 38 horsepower, the same as the catalog rating of the motor. The stroke of the motor is very long as compared with the diameter of the cylinder bore, 6½ inches or one and one-third times the bore.

The cylinders are cast of gun iron and there is provided a ½-inch waterjacket space entirely around them. The pistons are of the same material, slightly crowned and ribbed inside, and each piston carries three $\frac{5}{16}$-inch rings, all of which are placed above the piston pin. The crankshaft is of the three-bearing type and is a chrome-nickel-steel drop forging. The phosphor-bronze bearings are 4 inches long and 2¼ inches in diameter. The aluminum base chamber is divided horizontally into two parts, the upper half carrying the four arms by which the motor is supported on the frames, while the lower half of the base chamber acts as the oil pan. The general arrangement of the power plant and the chassis as a whole is shown in the plan view, Fig. 1. The intake side of the motor is illustrated in Fig. 2, and the exhaust side in Fig. 4. Inlet and exhaust valves are interchangeable and the lifts are fitted with adjusting screws. Hardened rollers and pins are used with phosphor-bronze guides.

A new design of carbureter is shown installed on the motor in Fig. 2. It is of the double-jet type and the auxiliary air inlets C and C 1 supply the additional air to each jet. The carbureter is automatic in action, the throttle valve being a sliding construction instead of the usual wing form, and operated by the suction of the pistons. Compression relief is secure by a set of auxiliary cams cut integral with the exhaust camshaft. These are brought into play by sliding the exhaust camshaft along the motor base so that the auxiliary cams lift the exhaust valves from their seats. This is controlled from the dash through the lever A, Fig. 4.

Ignition is provided for by a Bosch magneto located on the right-hand side of the motor on the forward supporting arm

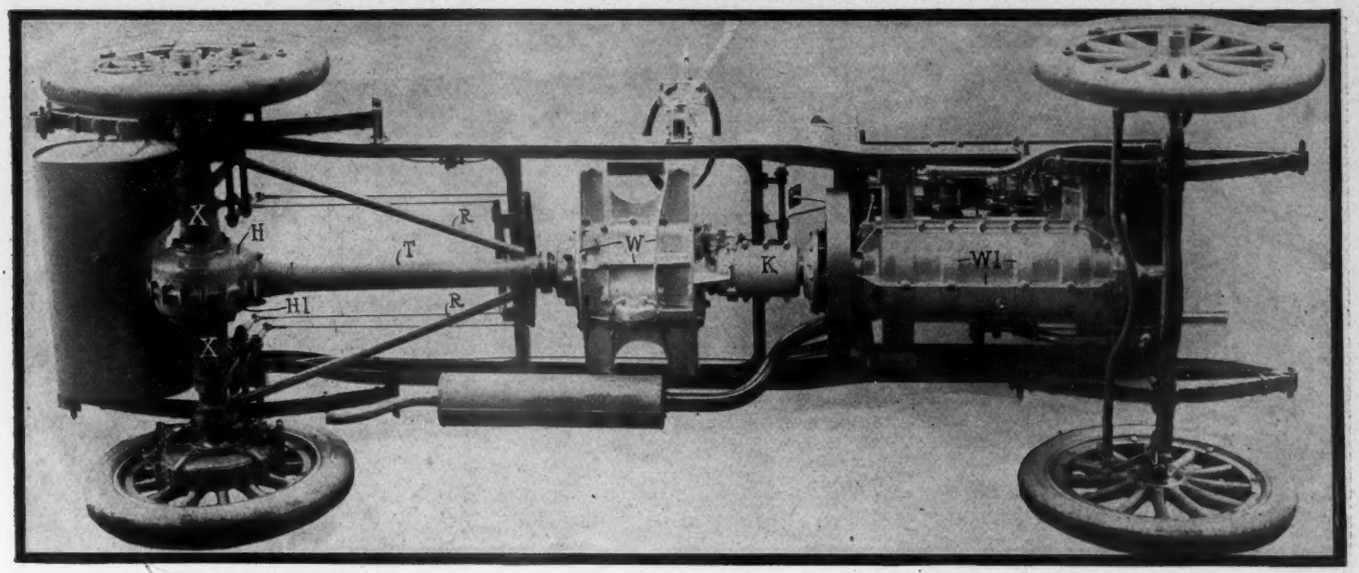


FIG. 3—THE UNDERSIDE OF THE SHAFT-DRIVEN SIMPLEX CHASSIS, SHOWING STOUT CONSTRUCTION THROUGHOUT

Few Changes Over Original Model

and driven by gears. A honeycomb radiator, flywheel fan and gear-driven centrifugal pump comprise the cooling system. A feature of the cooling arrangement is the provision of drain cocks at the bottom of the waterjacket between each pair of cylinders as indicated at D, Fig. 4. In the same illustration is shown the location of the pump and the water connection E to the jackets.

Lubrication of the motor is obtained by means of mechanical oiler operated by worm drive from one of the camshafts. The oiler is supported on the dashboard and contains a number of plungers actuated by a spring-controlled lever, which takes its motion from a cam. Leads from this oiler are taken directly to all the motor bearings, with an additional lead controlled by a petcock on the dash. The latter injects oil into the wristpin bearings through the hollow wrist pins. The pockets W 1, Fig. 3, are provided in the bottom of the crankcase for retaining oil to lubricate connecting rods in hill climbing.

In unit with the flywheel is the multiple-disk clutch. This is made up of forty-seven hardened steel plates. One central spring is used for engaging the clutch which is brought into play by the clutch pedal P 1, Fig. 5. The four-speed gearset is of the usual selective type, but it is of special design, involving the Simplex locking device. Reference to Fig. 6 will show the construction. The high gear is shown engaged and there is a bearing B 2 between the sliding gear for high speed and the master gear. The gears are locked together by an internal tooth gear system. The main shaft carries six splines or broaches, upon which the gears are slid by means of the gearshift yoke arms 1, 2 and 3. Between the outer bearing and the gearset proper are the sockets Y for the attachment of

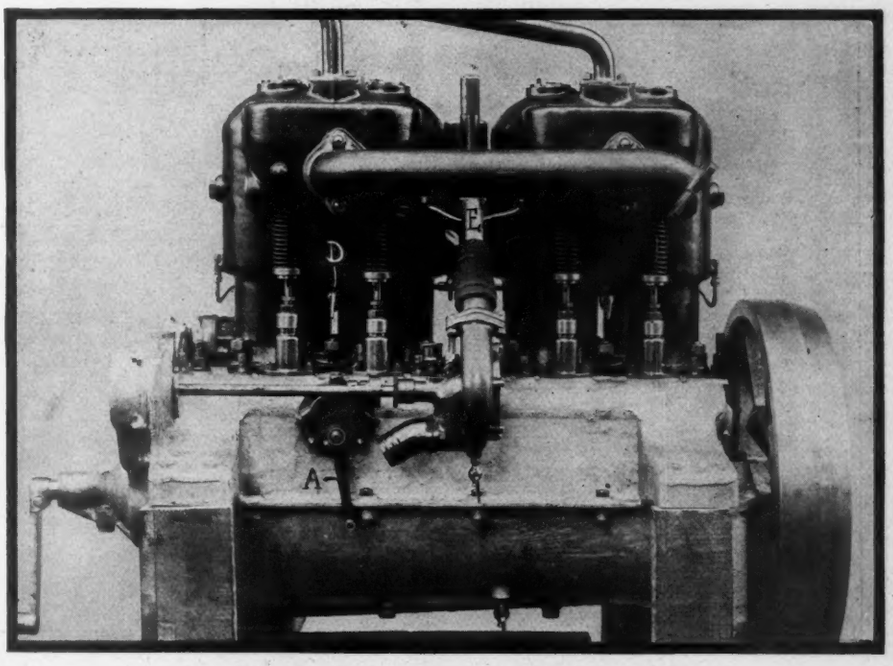


FIG. 4—MOTOR DETAILS OF SHAFT-DRIVEN SIMPLEX

Among the features are the drain cock D at the bottom of the waterjackets and the cam-operated compression release of which the arm A is shown

the clutch-shifting yoke, which is operated through the linkage L, Fig. 5. The gearset is hung from the side members of the frame by means of cast web arms as indicated in the top view of the chassis, Fig. 1, and the bottom view of Fig. 3, which also shows the webbing W to strengthen the under portion of the housing.

Between the clutch and the transmission gearset is a universal joint, the housing of which is shown at K, Figs. 3 and 5. The propeller shaft is connected at its forward end to the main shaft in the gearset through a universal joint, as shown in Fig. 6. Around this universal joint is a ball and socket joint S and B, Fig. 5, which supports the forward end of the torsion tube T. The torsion tube passes over the rear frame cross member which is dropped to clear it. The other end of the torsion tube rests in a sleeve which is bolted to the differential housing. The latter is split vertically into the two halves H and H 1, Figs. 3 and 5. Ball bearings carry the propeller shaft in the torsion tube.

The rear axle is semi-floating, the load being carried directly upon the live axle shafts that transmit the power to the road wheels. The outer ends of the rear axle are braced by the stay rods R, Fig. 3, which extend from the axle sleeves X X to the forward end of the torsion tube.

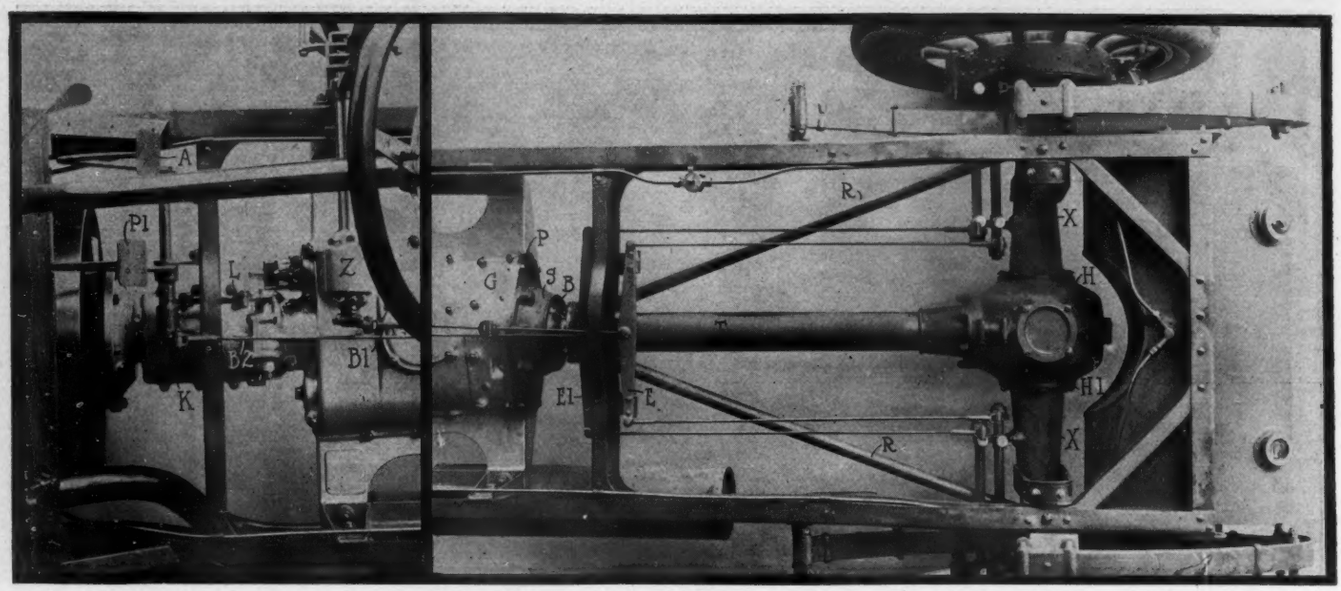


FIG. 5—STOUT TRANSMISSION SYSTEM ON THE SHAFT-DRIVEN SIMPLEX CAR

Service brakes operated through the pedal A, Fig. 5, are actuated by means of the brake connections B 2 through the equalizer B 1. The emergency brakes are actuated by a lever at the right of the driver through connection E 1 and equalizer E. Both emergency and gearshift shafts are supported on a lug Z cast on the top of the gearcase housing. The foot brakes are contracting and the hand brakes expanding, both lined with non-burn brake lining.

As to control, the throttle and magneto advance connecting rods to the motor are enclosed in the steering column, with a spring at the tail end designed to operate the return movement and take up the wear in the connections. Accelerator and muffler cut-out pedals also are provided.

The frame is of chrome-nickel-steel in the form of a 5-inch channel. The cross members have drawn up solid ends to obviate the necessity of using angle brackets and plates. The front axle is of the same material in I-beam form. The front springs are semi-elliptic, 2 inches wide and 36 inches long and the rear springs are three-quarter elliptic, 2¼ inches wide by 46 inches long.

In the wheelbase of the shaft-driven Simplex will be found a departure from the design of the model of a year ago. The distance between wheel centers is now 137 inches, a lengthening of 10 inches. The tires on the standard chassis are 36 by 4 inches in front and 36 by 5 inches in the rear. The wheels turn on exceptionally large ball bearings.

As to bodies, the chassis is marketed stripped or fitted with either a four-passenger toy tonneau, five or seven-passenger touring, limousine or landaulet bodies. The manufacturers of the Simplex cars had until 1 year ago pinned its faith to the double chain as a means of final drive to the rear axle, and in addition to the 38-horsepower shaft-driven model, two models with chain drive are continued.

THE arrangement and principle of operation of the Stearns-Knight sleeve-valve motor is being illustrated by means of a working model. It is made of heavy cardboard in three colors and shows the actual operation of the motor, not only the action of the sleeves and the opening and closing of the inlet and exhaust valve, but the operation of the pistons, etc.

The National Electric Lamp Association, Cleveland, O., is mailing to the trade a bulletin entitled "The Electric Lighting of Automobiles," which has just been issued by its engineering department.

The Pullman Forum is a house organ which the Pullman Motor Car Co., York, Pa., has recently introduced to the motor world. Pullman owners and prospective buyers will be interested in this booklet, which is to be issued quarterly by the company.

The General Motors Truck Co., Detroit, Mich., has issued a unique folder, "A Business Lead—Follow It," drawing the public eye to the attention of the Reliance trucks.

The story of the ocean-to-ocean tour, which was made by Premierites during the summer of 1911, is told by a series of pictures taken by the party en route. Facsimile telegrams tell the story of the pictures.

The Norman W. Henley Publishing Co., New York, is selling the isometric drawing paper, 9x12 size. This isometric paper is a ruled paper which facilitates ease in isometric perspective or projection drawing, which in the past has been a somewhat arduous task. The paper is peculiarly adapted to the use of the pattern maker or blacksmith, the machine designer, as well as the patent draftsman and architect.

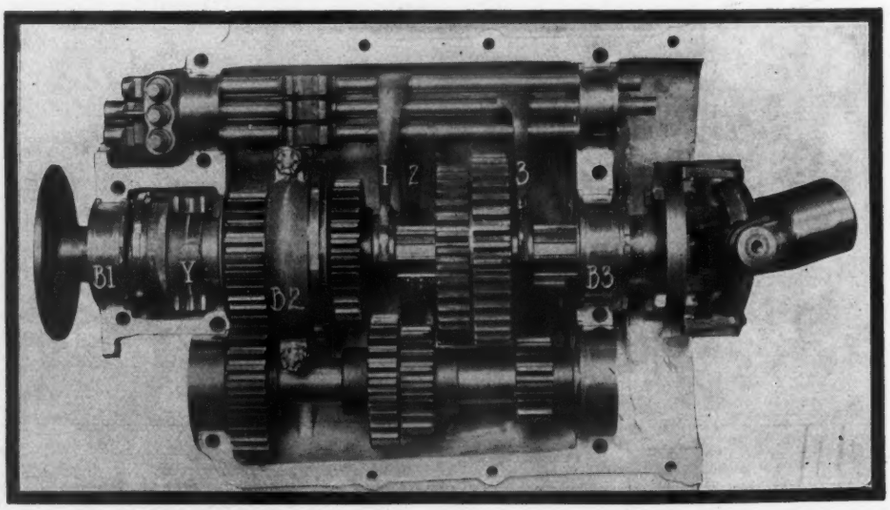


FIG. 6—SELECTIVE GEARSET ON SHAFT-DRIVEN SIMPLEX

The Motor Car Repair Shop

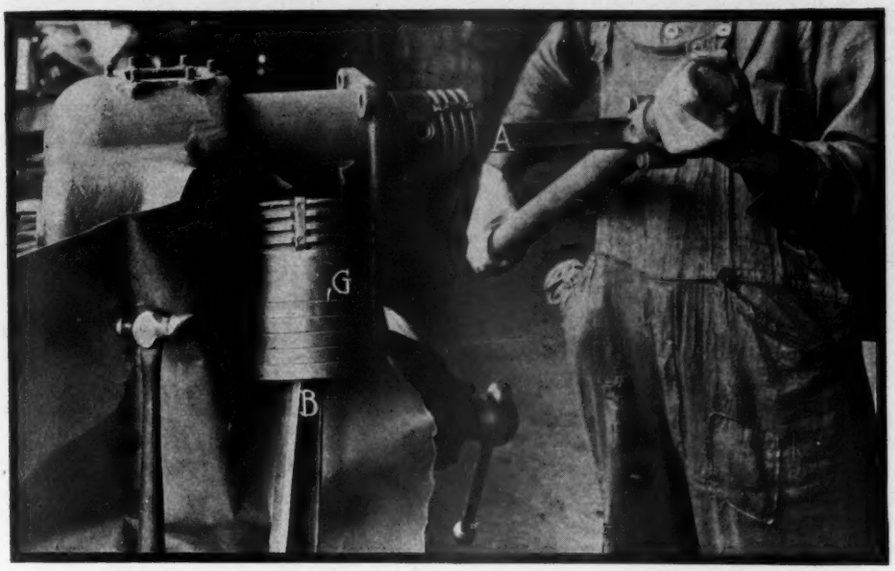


FIG. 1—HOMEMADE EQUIPMENT FOR OVERHAULING PISTONS AND CYLINDERS

IT often is found in tearing down a motor for an overhauling that the cylinders are a trifle out of round, and the error is made of trying to correct the evil by simply fitting in a new set of piston rings. If the cylinder is out of round it must be trued up either by reboring it or by reaming it. In reboring a cylinder not only is the services of an expert mechanic required but a very large lathe or boring machine also is required to perform the operation, and even then the work is not only expensive but often quite unsatisfactory owing to the inaccuracy of the workmanship. In Fig. 1 is shown the means employed by a repairman in a local repairshop of reaming out the cylinders, and in the same illustration is shown the special peening hammer employed to peen out the piston so that it will fit the cylinder after it has been reamed out.

The reamer for this operation, as one may plainly see, is made from an old piston and connecting rod, the head of the rod being bored out so that the connecting rod could be attached through either end of it for the purpose of reversing the piston. As shown in the photograph the workman is about to insert the reamer with the connecting rod passing through the head of the piston reamer, the cutting tools, of which there are three in number, being attached to the piston as shown by two set screws. These cutters may be adjusted by removing or replacing shims which are arranged beneath them. To start the operation of reaming, the connecting rod is attached as shown at A. The reamer then is worked into the cylinder as far as possible with the forward end of the piston acting as a guide. When the forward end of the piston has struck the head of the cylinder the reamer is withdrawn, reversed on the connecting rod as shown at D and then reinserted and the cut finished.

To fit the piston into a cylinder which has been thus reamed a concentric ring, that is, a ring which is the same thickness all around and bottoms in the groove, is fitted into the top groove and serves as a sort of guide for the piston head. The bottom portion of the piston is then peened so that up to as far as the top oil groove G or about 3 or 4 inches of the piston length it conforms to the size and shape of the cylinder. It often is easier to fit new cylinders and pistons to a motor than to repair them by this method, but there have been many cases where the above mentioned method has effected considerable saving.

Special Cleaning Room

Cleanliness in the motor car repair shop is a most important and desirable feature. There was a time when a wash rack and a small can of gasoline and a brush was about all the facilities provided for cleaning the old grease off parts requiring inspection and repair, and there are many shops today that can boast of nothing better. In Fig. 2 is shown a section of the special cleaning room of the Packard branch, Chicago. This room is entirely fireproof, is comparatively large and airy, and is separated from the rest of the shop by two large fireproof doors. It might be well to add that this one room has long since paid for itself several times over in the saving of insurance alone. The equipment of the room is very simple. At the left in one corner are two large tanks for storing gasoline, kerosene, and whatever other cleansing materials are employed. In the corner near the window is a large square trough, or box-like basin, made of wood, lined with zinc and mounted on castors so that it can be readily moved about the room. Almost an entire motor could be set into this trough and cleaned if desired. When used for cleaning motor car parts gasoline or kerosene is placed in this trough to a depth of about 2 or 3 inches, and this amount is sufficient to clean up all of the parts of an entire motor car, or perhaps several motor cars. There is practicaly no waste, and as dirt and grit washed from the parts settles to the bottom it can be used over and over again. The painter's dobbing brush greatly facilitates the cleaning operation carried on in connection with this tank. For cleaning the grease from transmission or rear axle gear cases and gear mechanisms large pans are provided into which the greater part of the grease and dirt may be thrown, then the brush and gasoline is brought into use to complete the operation. By using these pans the floor of the cleaning room may always be kept in a comparatively clean condition, and the labor of cleaning up considerably reduced.

FIG. 2—A ROOM SPECIALLY EUIPPED FOR CLEANING MOTOR CAR PARTS

From the

HUPMOBILE in Cairo—The Hupp Motor Car Co. has received a cablegram announcing the arrival of the Hupmobile world tourists in Cairo, en route for Bombay. The party expects to return in time for the New York shows.

Shield for Doctors—The Wayne County Medical Association of Michigan has adopted, for its own protection and for the convenience of the police, a red shield with a St. George cross outlined in black, as a distinguishing mark for motor cars driven by physicians. The device will enable the doctors to break the speed laws with impunity in emergency cases.

Bus Company Quits—The Belle Isle Auto Co., which has operated a bus line across Belle Isle bridge and around the island for several years, has gone out of business and its affairs are in the hands of a trustee. The company has been ordered to remove its machines and other property from the island, but the trustee has asked for an extension of time until he can dispose of the assets. It is reported that two of the buses, valued originally at about $5,000 each, have been sold for $1,400.

Outsiders Not Barred—The fourth annual Milwaukee motor show in the Auditorium at Milwaukee, Wis., from September 13 to 19, inclusive, is open to any and all exhibitors. No restrictions have been made, as reported. A large number of factories which have not yet gained representation in Milwaukee will have exhibits to introduce their products into the territory. "The list of exhibitors is not confined to dealers in Milwaukee county, as reported," says Manager Bart J. Ruddle, 71 Sentinel Building, Milwaukee.

Picture Show for Europe—The Studebaker Corporation has sent out an expedition in charge of H. A. Gilmartin for the purpose of giving Europe an illustration of American manufacturing methods. The party is provided with a complete moving-picture outfit, with several miles of film, which show every step in the manufacture of the E-M-F and Flanders cars. Mr. Gilmartin will show the film in London first and then throughout Great Britain and the continent, in coöperation with the foreign branches and dealers. The itinerary may be extended to include Asia, Australasia and South America.

Quaker City Election—With the exception of secretary, new officials to serve for the ensuing year were unanimously elected for all offices at the annual election of the Quaker City Motor Club. Paul B. Huyette, president of the Timers' and Scorers' Club, was chosen president, to succeed L. D. Berger, who retired after having held the office for 3 years. G. Douglass Bartlett was selected as first vice-president and Isaac T. Shoemaker second vice-president. Ralph L. Murray was elected treasurer. All the nominated candidates for secretary withdrew their names from the ticket, but A. T. James will continue to hold over until a successor is appointed. Nine members to serve as a board of directors were chosen as follows: L. D. Berger, George M. Graham, M. E. Brigham, Fred C. Dunlap, G. Hilton Gantert, P. D. Folwell, Frank Hardart, A. T. James and George E. Potts.

Another Georgia Tour—The tour-around-Georgia will not be the only motor run from a Georgia city to the Savannah races. The Washington, Ga., chamber of commerce is working on a proposed run, which will be intended to interest the motor car owners of northeast Georgia.

A Ford Charity—Henry Ford, president of the Ford Motor Co., has established a home for poor and orphaned boys near his native village, Dearborn, Mich. He has had a large farm house remodeled at considerable expense and has installed shower baths, a laundry and numerous other conveniences.

Hoosier Club Incorporated—After some little delay, the Hoosier Motor Club of Indianapolis has been incorporated. Officers were elected and announced some time ago. Incorporators named in the charter, which is granted under the voluntary association act without capital stock, are Charles A. Bookwalter, H. O. Smith, Joseph W. Selvage, C. W. Sedwick, H. H. Price, Bert A. Boyd and Homer McKee.

Wants Carnegie Medal for Percival—M. J. Hammers, general manager of the Abbott Motor Co., has started a movement to secure a Carnegie medal for Dr. Charles G. Percival, who is now on a world's tour with the Abbott-Detroit Bulldog, for walking across the Great Salt desert in Texas, last June, to secure aid for himself and his companion, George D. Brown, of Detroit. But for his pluckiness both would have perished. He walked 22½ miles through hot sand, ankle deep, and in a blistering temperature of 120 degrees; then, without rest, he guided the rescue party back over the trail in a sandstorm.

Governor Interested—Morton H. Luce, of the Velie Motor Vehicle Co.'s Chicago branch, has received telegrams from Governor Foss of Massachusetts and Mayor Fitzgerald of Boston congratulating the Velie company on the showing made in the Chicago reliability run.

Roads Standing Traffic—The fifth annual report of the Wayne county road commission of Michigan, just out, shows that the concrete roads built by the commission on the principal thoroughfares leading out of Detroit are standing up remarkably well and have required practically no money for repairs or maintenance. The commission announces its intention to continue this type of construction on a larger scale than ever, now that bonds are available for the purpose. A number of important changes in specifications have been made, which will tend to make these concrete roads even more durable.

Denver Estimates Car Values—Statements that the value of the motor vehicles owned in Denver is $13,000,000 are denied by Assessor Arnold, who has been compiling the returns from the tax payers' schedules. Arnold finds that 5,750 motor car licenses have been issued and 2,103 for motor cycles, but after sending circular letters to the holders of the licenses he has received hundreds of replies stating that the machines have been disposed of. Even were the full number of cars for which licenses have been issued actually in use their value would probably not exceed approximately $7,200,000, the computation being based on an aver-

OILING THE SAVANNAH ROAD RACE COURSE

Four Winds

age cost of $1,200, a figure arived at by statistics prepared by the car manufacturers of the country. Assessor Arnold thinks $5,000,000 a fair estimate of the value of motor vehicles owned in Denver.

Detroit Run Postponed—A cold wave Sunday, accompanied by a high wind, caused a postponement of what was to be the third under-sealed-orders sociability run of the Wolverine club, and the last of the season. Weather permitting, the run will take place next Sunday.

Bond Issue Ratified—The people of Baltimore county, Md., ratified the $1,500,000 bond issue for good roads at the recent state election. This bond issue was approved by the last general assembly with the proviso that the people of the county should decide for themselves whether they wanted the loan. As it has passed the $1,500,000 will be divided equally among the fifteen districts of the county, each one receiving $100,000 for improved thoroughfares in its territory. The bonds will be issued immediately and the work on the roads will start at the earliest possible time.

Helping the Boys—A unique demonstration of the motor car as an aid to charity is scheduled for November 27 in Detroit. For the purpose of raising funds for the boys' home, known as the Ford republic, which is reformatory in character, hundreds of machines will carry banners that day offering to carry passengers in any direction the car may happen to be going. The drivers will carry contribution boxes, and persons availing themselves of the invitation will be expected to contribute as liberally as their ability will permit, though donations of any amount will be accepted. The board of commerce, the Wolverine Automobile Club and the Adcraft Club will coöperate on the proposition, the Wolverine Automobile Club furnishing the cars.

Office for Avery—Percy C. Avery has been elected treasurer of the Milwaukee Automobile Club to succeed Clarke S. Drake, former president, and who has just been appointed chairman of the committee on good roads and highway improvement. Mr. Drake decided some time ago to engage in a scientific study of good roads and highway construction, improvement and maintenance, and therefore was obliged to relinquish the treasuryship.

Hoosiers Abolish a Toll Road—The commissioners of Washington county, Indiana, have purchased that part of the toll road running through the county which has been operated for many years by the New Albany and Paoli Turnpike Co., and this will become a free turnpike. Toll roads have disappeared from Hoosierdom rapidly in the last few years, only two counties, Floyd and Harrison, in southern Indiana, now having toll roads. Motor car owners and drivers have conducted a vigorous campaign for the abolition of toll roads.

Milwaukee Needs Space—The entire Milwaukee Auditorium, affording more than 65,750 square feet of floor space, will be required to house the 1912 motor show of the Milwaukee Automobile Dealers' Association, which will be held from January 13 to 19 inclusive. The main arena, which has heretofore sufficed to contain all pleasure car exhibits, will be supplemented by the arena basement, and the commercial vehicles will be placed in other large halls of the basement. The four smaller halls on the main floor will be used for accessory and parts displays. Bart J. Ruddle, 71 Sentinel building, Milwaukee, is manager, and is now receiving applications for space.

Will Hold Gemuethlichkeit Abend—The Milwaukee Automobile Club commenced its first social season in the new clubhouse on the Blue Mound road, at Cottrell avenue, Milwaukee, with a formal ball November 9. The next big event is a gemuethlichkeit abend on Thursday, November 23.

Motorist Carries a Whip—George N. Jacobi, of Cleveland, has a valuable hint for motor tourists. He carries a carriage whip on his tours, laying it ordinarily under the seat. Where ubiquitous cows on country roads refuse to budge until the car bumps into them, Mr. Jacobi has found that they always move when flecked with the whip.

Helping the Cause—The York Automobile Club of New York is taking an active part in pushing the Canada-to-gulf route, which is known as the Meridian road. It is proposed that the road run through York, and each of the members of the club has been assessed $5 to support the project, the amount being forwarded to the secretary. It also was voted to use the club money to purchase road markers.

Car Makes Cider—With apples more plentiful in central Illinois than for many decades it has been a problem what to do with them. Will Harlan, a farmer and motorist of Momence, decided to convert some of his apples into cider. In order to secure power, he jacked up the rear wheels of his car, attached a belt, started the engine and then commenced shoveling apples into the crusher. It required but a short time to make a barrel of cider.

Quakers Make Show Plans—A meeting of the Philadelphia Automobile Trade Association was held last week at the headquarters, southwest corner of Broad and Callowhill streets for the purpose of further perfecting plans for the forthcoming motor car show. Outside of the determination to boost the electric car part of the exhibition as well as the gasoline pleasure car, and a decision to allot accessory space to only the latest and most advanced products on account of the limited room at their disposal no further announcements concerning details of plans were made.

Syracuse as Touring Center—During 1910, 2,200 touring motorists, passing through Syracuse, N. Y., signed the visitors' book at the offices of the Automobile Club of Syracuse. This year there were 3,000, including motorists from California, New England, Mexico and Manitoba. There were eleven cars from California, five from Oregon and six from Washington. The most traveled paths have been those leading to Boston on the east and to Detroit on the west, the club having distributed hundreds of routes taking tourists to those cities. Fully 30 per cent of the tourists had been in Syracuse before.

BEAUTIFUL PART OF SAVANNAH ROAD RACE COURSE

The Realm of the Commercial Car

TYPE OF MOTOR BUS IN USE IN GERMAN CITIES

German Truck Situation

GERMANY is accepting the commercial motor car as she accepts everything that is new but worthy—slowly, though with great certainty. Motor trucks are not yet as numerous as they are in the other commercial countries, for there are many natural obstacles to be overcome. The conservative Teuton, to be convinced, must have proved to him, not once but many times, that he can operate motor vehicles at less cost and with greater convenience than his old-fashioned ones. The fact, however, that the manufacturers are demonstrating this daily and with unvarying consistency is insuring for Germany a substantial and long-lived truck business.

Whatever can be said of the motor vehicle situation in Berlin is, in general, true of the whole Empire, for more than a fourth of all the commercial cars in Germany are operated in this great city.

In America it would probably be difficult to find men who would drop into a shoulder strap and, side by side with a powerful dog, pull heavily loaded carts over the streets. Such a class of labor does exist in Germany, and the almost pathetic cheapness of it makes this mode of transportation of considerable importance.

The small package delivery is largely effected by thousands of tricycles. They are necessarily slow, and large numbers of such machines are required by a store with any considerable volume of business. The German has not yet learned to count time as equivalent to money, however, and the wages of the riders are ridiculously low, so this method offers sharp competition to the light delivery wagon. The cyclonette or motor tricycle is replacing many of these man-power vehicles and seems to give excellent satisfaction.

In regard to maintenance, fuel is very little more expensive than it is here, but the thing that does increase operating cost is the utter lack of garage room. Live storage is itself quite expensive and frequently the nearest available will be 20 or 30 minutes from the headquarters of the car.

The buses so characteristic of Berlin are for the most part 4-ton chassis with large top-heavy appearing bodies. They carry variously twenty to twenty-nine passengers, the exact number for each car being fixed by law and never exceeded. They are faster than the surface cars, and the fares are only slightly higher. The operation and maintenance cost is stated to be 63 pfennig per car kilometer, or about 23 cents per car mile.

The principal trucks in use are the small 1½- and 2-ton and the 5-ton. The intervening sizes have not yet made their appearance in any great quantity.

The question of final drive is as unsettled as in our own country, but the preference seems to lie with side chains for the larger sizes and bevel gear for the small ones. Annular spur gearing is frequently seen, but the worm type seldom. The beautifully maintained streets have attracted a few owners to steel tires, but the majority of the cars still use rubber. There does not seem to be any inclination whatever toward extending the bodies forward and placing the driver over the motor, for practically all the seats are well back of the dash.

Trailers are quite rarely used in the city. Their principal field of usefulness seems to be in making longer hauls through the country, where they may often be encountered.

An idea of the exact size of the commercial vehicle idnustry can be obtained from the following statistics of the trucks in operation last year:

	Berlin.	German Empire.
Less than 8 horsepower	700	1,695
8 to 16 horsepower	229	999
16 to 40 horsepower	147	1,384
Over 40 horsepower	9	128
Total	1,085	4,206

MOTOR-DRIVEN CAPSTAN

The latest vehicles produced in the Paris factory of the Saurer company are provided with two interesting improvements: a motor-driven capstan and a well-designed coupling allowing a trailer to be used. The chassis itself has undergone little change, the motor being the firm's standard four-cylinder of 110 by 140 mm.

FIG. 1—MOTOR-DRIVEN CAPSTAN BROUGHT OUT BY SAURER

—4.33 by 5.51 inches—bore and stroke, mounted throughout on ball bearings, with lubrication under pressure and water circulation assured by pump. The frame members are inswept just to the rear of the countershaft, to allow the semi-elliptic springs to be recessed, thus decreasing the track at the rear, without, however, any loss of body width. This is an improvement which was adopted nearly a year ago and has since been employed as standard on the firm's trucks.

The innovation is to be found in the rear portion of the frame, the extreme rear, immediately above the gasoline tank, being considerably strengthened and forming a platform on which a capstan C Fig. 1 is mounted. The drive for the capstan is by means of a horizontal shaft S Fig. 2, operated by worm gearing from the jackshaft and allowing of the use of the four gears normally used for driving the vehicle. The capstan at the rear does not necessarily curtail the length of the body, for on the type of open or closed body built to fit the army regulations, the clearance between the top of the frame members and the bottom of the body is sufficient for housing this accessory. This type of body is one most commonly employed for commercial vehicles, being a platform with demountable sides with the addition of metal hoops for carrying a tarpaulin cover converting the vehicle into a completely closed truck, which is useful in all kinds of weather and all seasons of the year.

The coupling is another interesting and well-designed feature. It is composed of a steel housing H bolted to the transverse rear frame member and containing a connecting link L with spring buffers. The extremity of the connecting link is provided with an eye through which the shaft of the trailer coupling is passed and secured by a pin. At each side of the main coupling are eye bolts E to allow of chain connection to the trailer, the chains of course only coming into use in case of a rupture of the main coupling, a sort of an emergency device.

The Saurer company provides the trailers, which, like the tractors, are fitted with solid rubber tires, and provided with brake system. The brakesman is mounted on the front of the trailer and is protected from dust by a stout canvas screen carried horizontally between the tractor and trailer.

BLAIR WORM-DRIVEN COMMERCIAL MOTOR WAGON

BLAIR WORM-DRIVE TRUCKS

A new line of commercial vehicles in which worm gears are employed in the final drive has been produced by the Newark Machine Co., of Newark, O. The trucks are made in three sizes, 1½, 2½ and 3½ tons capacity. To eliminate the universal joints, the power plant is supported on a subframe which is hung by a three-point support on the drivng axle in the rear and the main frame in front, so that the driving shafts always are in line.

The operator is placed beside of, rather than on top of or behind the motor, combining short wheelbase and overall length of the former type with ease for the driver to get in and out, and eliminating excessive overhang.

Special attention has been paid to accessibility and demountability, with the result that every unit, motor, clutch, transmission, steering gear, etc., is not only accessible for examination and adjustment but can be taken out independently.

The motors used in these trucks are made by the Continental Motor Co., and are of the four-cylinder, water-cooled type, 4⅛ by 5¼ inches cast en bloc on the 1½-ton, and 4½ by 5½ inches with cylinders cast in pairs on the 2½ and 3½-ton, both motors using Bosch fixed ignition and inclosed valve mechanism. The features of these trucks are said to be their extreme quietness and great coasting ability, both due to the use of worm drive, it is claimed by the makers.

TEST OF FIRE APPARATUS

Two outfits of chemical fire apparatus mounted on chassis made by the White Co., Cleveland, were submitted to a hardy test by Commissioner Johnson of the New York fire department recently, in which the trucks distinguished themselves by their efficiency.

In order to imitate real conditions as much as possible, a wooden structure was erected in front of the fire department's repair shop at Fifty-eighth street and Twelfth avenue. The frame work was filled with shavings and dry wood and was so ventilated that the fire would have a chance to burn freely. Finally, the structure was soaked with kerosene, and after a match was applied it blazed so fiercely that the heat drove back the large crowd which had gathered to watch the demonstration.

After giving the fire a chance to get well under way, the word was given for the firemen to get to work, and 3 minutes after the streams from the chemical wagons were directed on the flames it had been subdued to a few smoking embers. The fire was so quickly and effectively checked that the entire outside walls of the structure remained in good condition—simply being charred on the inside. The demonstration is said to have satisfied Commissioner Johnson and to have demonstrated to the public the speed and practicability of motor chemical fire appartus.

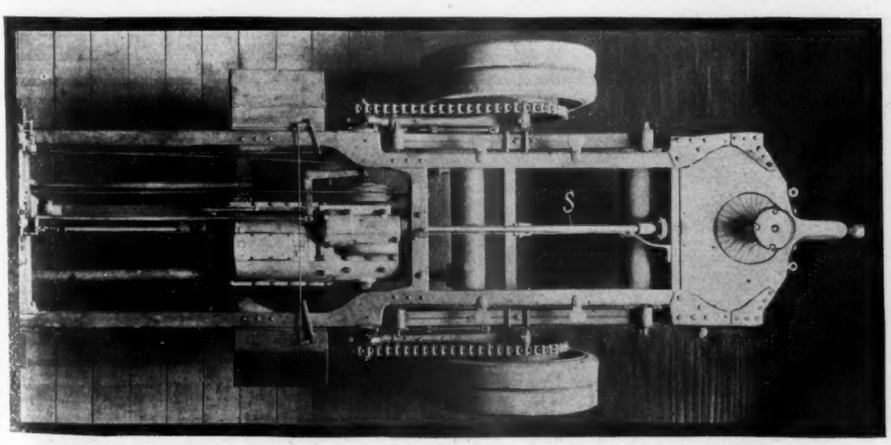
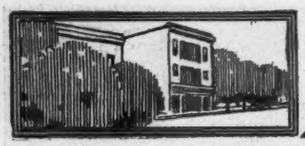


FIG. 2—DRIVE USED ON MOTOR-DRIVEN CAPSTAN



Among the Makers and Dealers

PARTRIDGE in New Position—A. G. Partridge has been appointed assistant sales manager of the Firestone Tire and Rubber Co.

New Stearns Agents—During the past few weeks the F. B. Stearns Co., of Cleveland, Ohio, has added a number of representative dealers to its list. Among these are the Pence Automobile Co., of Minneapolis; the Fisher-Gibson Co., of Indianapolis, and the McDuffee Motor Car Co., of Denver.

Axle Suit Dismissed—Suits brought in the federal court at Indianapolis by Thomas J. Lindsay and Willard Harmon, against the Cadillac Automobile Co. and the Westcott Motor Car Co., Richmond, in which an infringement of patents covering a bevel gear floating type of axle was charged, have been dismissed. These companies used axles manufactured by the Timken Roller Bearing Axle Co., with which Lindsay and Harmon have recently reached a satisfactory settlement.

Omaha Chooses Dates—At a second meeting of the directors of the Omaha Automobile Show Association it was decided to hold the Omaha show from February 19 to 24. It was decided to hold the show at the Auditorium again this year, as it is more centrally located than the Coliseum. But as the Auditorium has been too small for the show for the last 2 or 3 years, it is planned to build a temporary annex on a vacant space to the south of the building, for the commercial vehicles. This will leave the main floor of the Auditorium for the pleasure cars, and the stage for accessories. As there have been thirty-three firms represented in this association and twelve more are applying for admission, the 1912 show will be by far the largest ever given in Omaha.

Metz Company Expanding—The Metz company, of Waltham, Mass., has been compelled to increase its factory facilities, and additional floor space has been secured by taking over another building nearby, the former home of Governor Gore, of Massachusetts, one of the old style colonial mansions. The general offices will be transferred in a few days to the latter building, and it will be used as an administration headquarters giving the space in the factory used for offices over to manufacturing. The entire sales and accounting department will be located in the mansion. The purchasing department, under the direction of C. H. Wolf, as well as the repair and parts department, will remain at the factory. The office of Superintendent J. C. Robbins will remain at the factory, while President C. H. Metz, Treasurer C. J. Spiegelberg and W. H. Schwartz, general sales manager, will be located in

PENCE BUILDING IN MINNEAPOLIS

the new administration building. Next spring the company plans to build a new structure on the newly acquired grounds.

Goodyear Plant Resumes—The Goodyear Tire and Rubber Co. has resumed operations after a shut down for the purpose of installing new equipment and transferring factory power from a steam to an electric basis.

Syracuse Show Plans—Plans are progressing for the annual show in the state armory at Syracuse, N. Y., this winter, under the auspices of the Syracuse Automobile Dealers' Association. The date and general arrangements are not yet determined, but W. A. Marshall will again be the director-in-chief.

Insured for a Million—An interesting incident has come to light in connection with the recent banquet tendered to John N. Willys, president of the Willys-Overland Co., by the Elmira Business Men's Association, at Elmira, N. Y. In anticipation of the 3 days' trip from Toledo to Elmira $1,000,000 of accident insurance was placed on the lives of six officials of the Willys-Overland Co. This is said to be the heaviest amount of accident insurance ever taken out for a like purpose by six men for such a short duration of time.

Providence on the Calendar—There is to be a motor show in Providence, R. I., next January, and it will be conducted this time by the Rhode Island Licensed Automobile Dealers' Association. The former shows were conducted by M. Prescott, but this year he was unable to get the armory for show purposes, so Providence had no show and the dealers had to content themselves with the Boston one. The dealers have secured permission to use the armory next winter, and have picked out the week of January 22 to 28 for the show. Both pleasure and commercial vehicles will be displayed, the former in the main drill hall that gives a space of approximately 38,000 square feet, and the other vehicles and accessories in the basement.

Self-Starter for Cole—A self-starter and an electric lighting system have been added to the Cole cars manufactured by the Cole Motor Car Co., of Indianapolis. The starter adopted is an invention of the Prest-O-Lite Co., of Indianapolis; while the lighting system is that of the Ward-Leonard Electric Co., of New York.

Growing Benefit Association—Benefits amounting to $1,614 were paid out during the last fiscal year by the Velie Employes' Aid Association, according to the treasurer's report at the annual meeting of the society. Benefits were paid to 115 members of the association, composed of 300 employes of the Velie carriage and Velie motor vehicle works. That the association is growing fast is evident from the fact that forty-two prospective names are now on file. Officers were elected as follows: President, J. D. Williams; vice-president, George Serganty; secretary, George L. Boomer; treasurer, M. F. Smith.

Anderson Invading Europe—The Anderson Electric Car Co., of Detroit, maker of the Detroit electric, is planning a vigorous European campaign and has appointed John F. Monnot European representative. Mr. Monnot has arranged to ship Detroit electric cars and trucks to Paris and London. He will first establish branches in these cities and then in the other large centers of Europe. Before coming to this country to conclude arrangements, he made extensive investigation of the European market. He has already arranged with the London Omnibus Co. to put on fifty buses. In Paris the head of one of the big transportation companies which delivers goods for the department stores, has already agreed to take thirty trucks, it is reported.

Midland Engineer Killed—John E. Miller, chief engineer of the Midland Motor Co., was struck Friday afternoon by a Burlington passenger train while crossing the tracks at Moline, Ill., and died in the hospital less than an hour afterward. At the Y. M. C. A. in Davenport, Ia., the class in motor car engineering was awaiting the arrival of Mr. Miller, who was to give a lecture that evening. Miller, together with Charles S. Pope, Roy Kelly and Ed Gamble, all of the Midland factory, were returning from work at the time of the accident, and killed the engine on the tracks at Fifty-fifth street, Moline, as a passenger train was approaching at a speed of 40 miles an hour. The other occupants escaped injury. Mr. Miller was 39 years of age. He became affiliated

with the old Deere-Clark company 5 years ago, remaining with the Midland company when the stockholders reorganized.

Swineheart Progress—The Swineheart Tire and Rubber Co. is engaged in the development of business for its new cellular solid tire. The company is to build an addition to its plant at once to take care of the business already in sight and relieve present crowded conditions.

Grand Prize for Acheson—The United States government's representative at the Turin Exposition has notified the International Acheson Graphite Co., of Niagara Falls, N. Y., through the department of the interior, bureau of mines in Washington, that the jury of awards of that exposition has awarded that company a grand prize on the exhibit of its products.

Price of Platinum Increasing—"The price of platinum continues to rise steadily," says H. E. Krause, general superintendent of production of the Remy Electric Co., of Anderson, Ind. "In Berlin, Germany, which is one of the centers of platinum trade, it has recently been quoted at $650 per pound. Platinum is used in large quantities in the production of Remy magnetos. Only a few days ago we received a shipment of platinum points, the package being about as large as your two fists, and the bill was close to the $5,000 mark."

American Motors Co. Installs New Plant—The American Motors Co., of Indianapolis, Ind., has moved part of its factory organization into its new building at Meridan street and the Belt railroad. The main building is 60 by 160 feet and has a wing on the north side 40 by 160 feet and a corresponding wing on the south side, 30 by 145 feet. These two wings are brick and frame; the one on the north side being used entirely for the finished stock room and the south wing is devoted to motor assembling and frame building. In the rear of the main building is a large wash house for cars covering an area 90 by 150 feet, and just north of this is located the power plant. At the rear of the wash house is another large storage building constructed of brick covering an area of 100 by 150 feet. At the extreme rear of the 2-acre lot are the test sheds, which are about 70 by 75 feet. Excellent shipping facilities are provided. A private switch enters the grounds and excellent docks and platforms have been provided for receiving and shipping purposes. All of the buildings previously occupied are also still retained.

New Diamond Branch—The Diamond Rubber Co. has opened a new branch at Charlotte, S. C., under the temporary direction of J. F. Lanier. The Diamond company is also establishing a branch of its own at Kansas City. Hitherto this territory was occupied through an agency.

Chase Directors Are Elected—At the annual meeting of the stockholders of the Chase Motor Truck Co., the following directors were elected: A. C. Chase, A. M. Chase, L. O. Bucklin, H. P. Bellinger and E. C. Witherby. The directors elected the following officers: President, A. M. Chase; vice-president, H. P. Ballinger, and secretary and treasurer, E. A. Kingsbury.

Moon Expansion—The rapid growth of the Moon Motor Car Co. makes it an immediate necessity that another addition be made to the now extensive plant of the Moon Motor Car Co.'s factory. The work is to be started immediately, and will be pushed with all possible haste, so that the brick work will be completed, if possible, before snow falls. This addition will increase the capacity of the plant 25 per cent, though owing to the fact that the space will be used to relieve the congested departments, it will increase the factory, as far as production is concerned, fully 40 per cent.

Checking the Testers—A young, buxom, bucolic lassie has been placed on the pay roll of the testing department of the Mais Motor Truck Co., of Indianapolis. Of course, she does not don khaki uniform and goggles and drive these powerful beasts of burden over the rough country roads, but her part is none the less important. She lives with her rural parents about 40 miles from Indianapolis, along the main highway. In order that all cars may be given a uniform severe test, the company has issued an order that they will cover the same route. At different points the children of farmers have been employed to watch for these testers, check them, recording the date and time upon which they appear, taking the number of every car. The young women mail their reports every day to the Mais company. The girls are given this job because they are at all times at home and hear the honk of the testers, while usually the boys are in the fields helping their fathers.

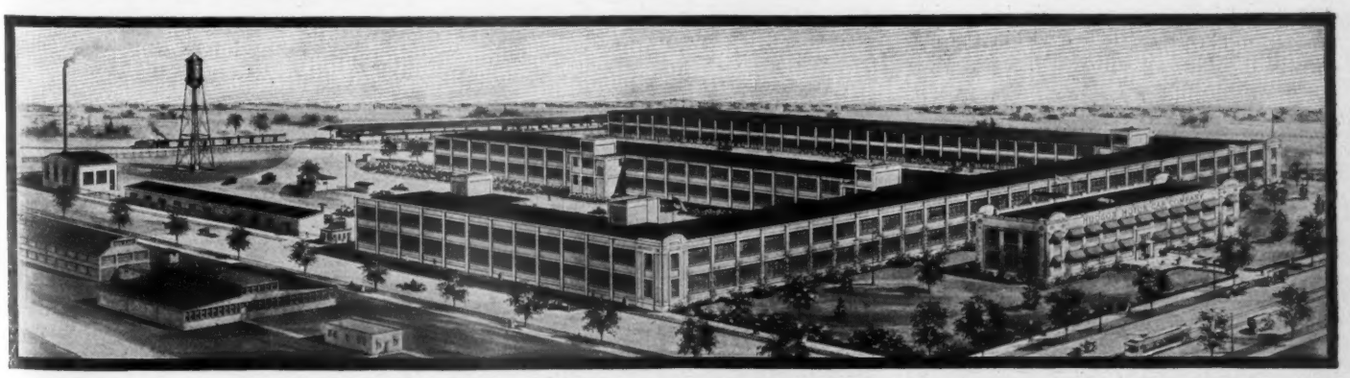
Remy Buys a Plant—It is announced that the Remy Electric Co., of Anderson, Ind., has purchased the plant and patents of the R. G. Peters company, Grand Rapids, Mich., which has manufactured headlights, and the Peters plant will be consolidated with the one at Anderson.

Swinehart Business Good—The Swinehart Tire and Rubber Co. is planning an addition to its factory in Akron, 500 by 200 feet, and several stories high. This is made necessary by business growth, October's business this year being 64 per cent larger than October last year. A new branch has just been opened by the company at Memphis.

Norwalk in the Market—The little city of Norwalk, O., will purchase a $10,000 motor fire engine. An ordinance authorizing the purchase was passed some time ago by the council. Later the council decided to submit the proposition to a vote of the people. An injunction was sought restraining this action, but the injunction was denied and the question will be submitted to a vote. It is said the people favor the proposition.

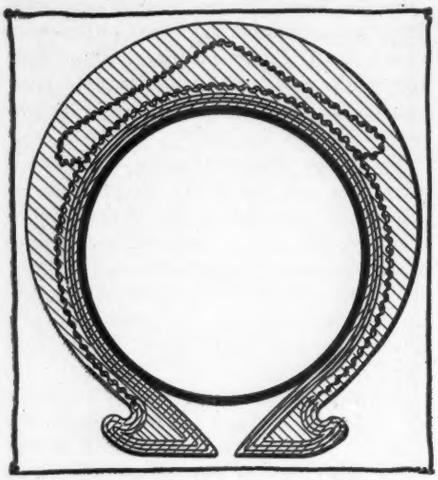
Another Hudson Plant—The Hudson company is building a large new factory in connection with the Jefferson avenue, Detroit, plant which was erected just 1 year ago. Ground was broken last week. The new factory adjoins the east end of the plant and is 530 feet in length, 60 feet in width and two stories in height. It is to be of the same type of construction as the buildings put up last year, which are of steel and concrete. The new building adds exactly 63,000 square feet of floor space to the home of the Hudson cars.

Hallowell Makes a Change—Announcement is made that Montgomery Hallowell, general advertising manager of the United States Motor Co., has resigned to join the forces of the H. E. Lesan Advertising Agency, where he will assist in the handling of the United States Motor Co. advertising and in the broadening work of the Lesan agency. Gridley Adams has been appointed to succeed him.



HUDSON COMPANY ERECTING ADDITION TO ITS DETROIT PLANT

Current Motor Car Patents



WILSON & GUDER VEHICLE TIRE

AUE TIRE PROTECTOR—No. 1,006,712, dated October 24; to Rudolph Aue, San Antonio, Tex.—The tire protector to which this patent relates comprises a strip of fabric for bearing over a pneumatic tire, a relatively narrow strip of flexible non-puncturable material bearing upon the fabric strip, a relatively wide strip of flexible non-puncturable material bearing over the narrower strip of non-puncturable material and having contact with the fabric strip, and means for independently securing the non-puncturable strips to the fabric strips.

Snyder Motor Car Fender—No. 1,007,151, dated October 31; to William Snyder, Rochester, N. Y.—This patent pertains to a fender for motor cars having a swinging portion, the swinging operating member supported on the vehicle and having two arms lying at opposite sides of the vehicle and links connecting the arms with the swinging portion of the fender.

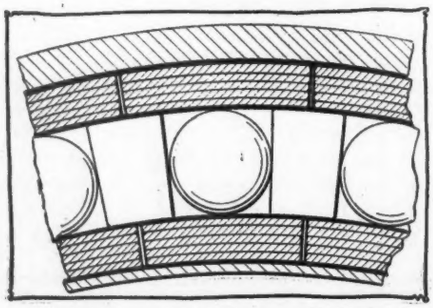
Wilson & Guder Vehicle Tire—No. 1,007,018, dated October 24; to Harry Wilson and Carl Guder, McKeesport, Pa.—This patent covers a motor car tire comprising a casing, a reinforcing for the casing comprising a canvas fabric body suitably disposed and incorporated within the casing, an armor fabric imbedded within the casing and extending into the heel portions

Ideas of the Inventor

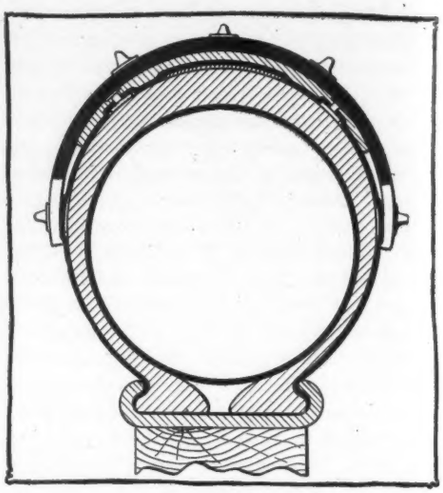
thereof, and disposed above the reinforcing fabric, hook portions formed on the terminations of the side portions of the armor fabric, a second armor fabric embedded and vulcanized in the tire casing and disposed above the first armor fabric, this second armor fabric being V-shaped in cross section with inclined sides formed thereby to ward off any sharp point which might pierce the casing, and hooked portions formed at the terminations of the sides to securely anchor the second armor fabric.

Gill Motor Starter—No. 1,007,094, dated October 31; to Stonewall Jackson Gill, Roanoke, Va.—As illustrated herewith, this patent pertains to a starter for motor car engines having in combination a shaft with an arm on the end arranged within an engine cylinder and provided with a flywheel having buckets at the other end, the engine cylinder having oppositely arranged serrated members, the arm of the shaft having sparking material thereon adapted to coöperate with the serrated members, and means for storing air adapted to be forced against the buckets of the flywheel, thereby imparting motion to the shafts.

Wurmser Starting Device—No. 1,007,171, dated October 31; to Henry O. Wurmser, Loraine, O.—This patent relates to a starting device for gas or explosive engines which has in combination with an engine shaft a clutch member carried by the shaft, a cranking pulley movable on the



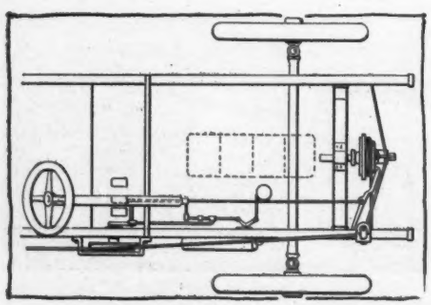
GRENIER NON-PNEUMATIC TIRE



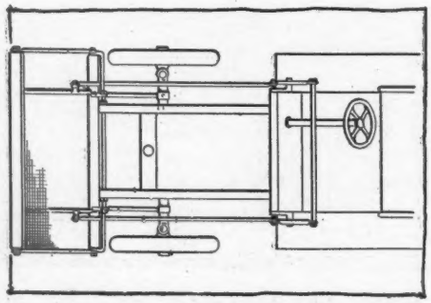
AUE TIRE PROTECTOR

engine shaft longitudinally and constituting a clutch member, this pulley being provided with a collar, a coil spring connected to the pulley and to the engine frame, a flexible member wrapping around the pulley, means for actuating the flexible member to turn the pulley, means for moving the pulley longitudinally of the engine shaft and means comprising a dog mounted on a stationary part of the structure, a spring arm connected to the dog and adapted to bear against the face of the collar carried by the pulley and bring the dog into engagement with the collar for positively and automatically separating the clutch members on reversal of the engine shaft.

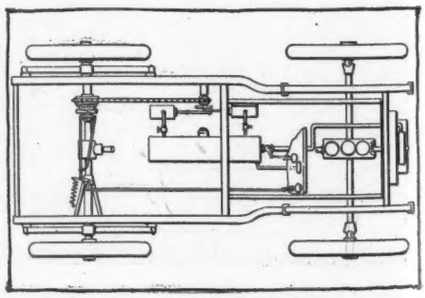
Grenier Non-Pneumatic Tire—No. 1,005,961, dated October 17; to Oscar Grenier, Boulogne on the Seine, France.—The tire to which this patent relates comprises a non-pneumatic elastic tire for vehicle wheels having in combination an inner tube, balls and plugs imbedded in the inner tube, single strips made of suitable material and forming independent sections wrapped around the tube, and an outer tube inclosing the whole and a tread cover adapted to receive the outer tube. As shown in the illustration, the balls are arranged to alternate with the wedge-shaped blocks.



WURMSER STARTER



SNYDER MOTOR CAR FENDER



GILL MOTOR STARTER

Development Briefs

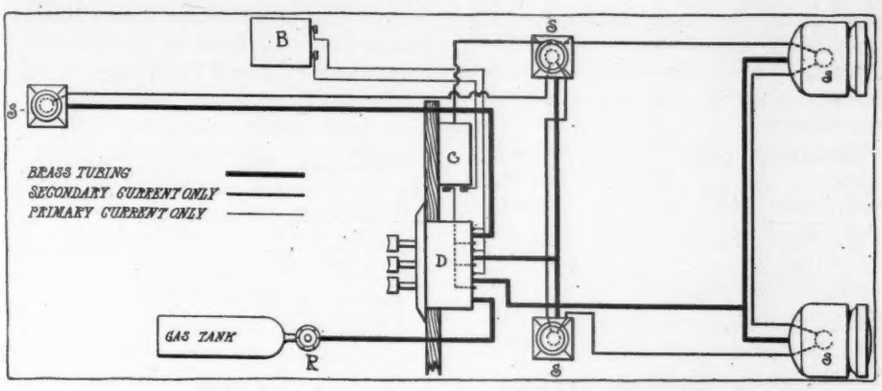


FIG. 1—CONNECTIONS OF START-LITE SYSTEM

Little Giant Tire Pump

A BELT-DRIVEN air compressor for tire inflation in garages is illustrated in Fig. 2. It is designed to be bolted to the garage floor and is equipped with a very heavy flywheel, so that it may be operated either by hand or by belt, as desired. The compressing cylinder and housing bearing are cast in one piece of close-grained iron, the cylinder being bored to within 1/32 of an inch to size and finished by reaming. In both the craknshaft and housing bearings babbitt metal is used. The piston is of the trunk pattern with three accurately fitted expansion rings. Valves are of high-grade bronze. The compressing cylinder has a bore of 3 inches and a stroke of 4 inches and is designed to deliver 4 cubic feet of air per minute at a speed of 250 revolutions per minute. The compressor weighs 200 pounds and requires 1 horsepower to deliver its rated capacity at a pressure of 100 pounds per square inch. It is the product of the Zanesville Machine Co., Zanesville, O.

FIG. 2—LITTLE GIANT TIRE PUMP

Start-Lite Lamp Lighter

The manifest advantages of a means for igniting acetylene lamps from the car rather than from the road have resulted in the appearance of many devices intended to eliminate the use of matches. Among the latest of these is the Start-Lite lighting system, which is marketed by the Start-Lite Co., Chicago. The electrical and gas connections of the system are illustrated in the diagram, Fig. 1. It will be seen that the system consists of five elements; an automatic governor or regulator R by which the pressure of the gas as it issues from the tank is kept uniform, the controller D, the spark coil C, battery B and the sparkers S in the lamps.

The chief feature of the device is the controller D. This is located on the dash and is equipped with three buttons by which the lamps are turned on and ignited, turned down, or extinguished. The controller regulates both the flow of gas and electric current to the burners, and is a solid casting of special alloy brass. The spark coil is specially designed for this service and is of Pfanstiehl manufacture. The sparkers can be attached to any lamp and the gas from the burners is ignited by a spark between the points of the sparkers in the same way that the gas is ignited in the cylinder of the motor. The arrangement of the sparkers on the burner is shown in Fig. 4. The sparkers are mica insulated and platinum-tipped.

The operation of the Start-Lite is very simple; a button each for head, side and tail lights. A push on the button lights the lamps, a second push on the same button extinguishes them. To reduce the lights press the button gently until the light is at the desired height.

Hercules Motor Starter

A motor starter in which the engine is turned over by a lever from the seat has been recently placed on the market under the name of the Hercules starter by the Hercules Auto Starter, Inc., of San Francisco. The operation of the device is purely mechanical, a ratchet which engages with a gear on the crankshaft and takes the place of the starting crank being the mechanism employed. The ratchet is brought into play by a lever beside the driver's seat and the motion is carried to the front of the car by a rod.

That the attachment does not spoil the appearance of the car is evident from Fig. 3, which also is intended to bring out the ease with which the motor may be started, an especial inducement for feminine motorists. The starter proper weighs only 8 pounds and is 5½ inches in diameter.

FIG. 3—HERCULES MOTOR STARTER

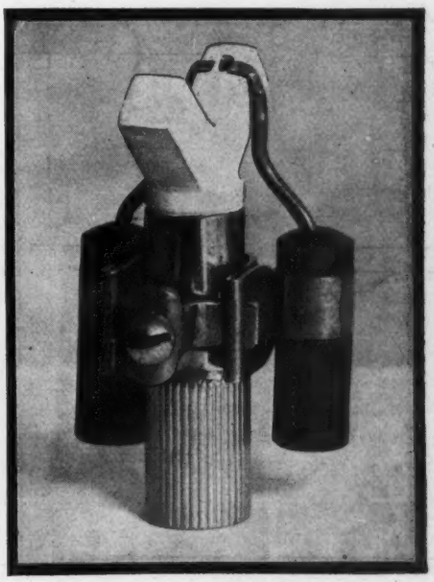


FIG. 4—START-LITE BURNER

Brief Business Announcements

BEAVER CITY, NEB.—A new garage is being erected here by Birsell & Son.

Louisville, Ky.—The Clark Motor Car Co. has increased its capital to $60,000.

David City, Neb.—The David City Auto Co.'s new garage was completed recently.

Chicago—The R. D. L. Mixing Chamber Co. has moved from Chicago to Springfield, Ill.

Louisville, Neb.—The garage of William Vlok, here, has been purchased by Haney Brothers.

Sheboygan, Wis.—Arthur F. Raab, 809 North Eighth street, is a new agent for the Sampson.

Indianapolis, Ind.—The Stutz Auto Parts Co. has moved into its new fireproof, three-story building on West Tenth street.

Beaumont, Tex.—George Sweet and J. G. Minter have bought the interests of Louis Derango in the Beaumont Motor Car Co.

Erie, Pa.—The Stirling Brothers Co., which is capitalized for $15,000, will erect a garage on Twelfth street, near French. The building will be 30 by 100 feet.

Los Angeles, Cal.—The Michigan car will be introduced in southern California by C. L. Perrin, who will open the Los Angeles agency on West Picon street.

Portland, Ore.—C. A. Eastman has resigned as manager of the White Motor Car Co. His place will be taken by S. C. Houston, a member of the company's force.

Tacoma, Wash.—C. G. Arnold is now associated with the Pacific Car Co. in the capacity of sales manager. Mr. Arnold was recently in charge of the Olympic Motor Car Co. of Seattle.

San Diego, Cal.—The Western Motor Co. of San Diego has leased a new home and will shortly move to Front and C streets. The Bateman-Buoy Co. has secured the San Diego agency for Flanders and E-M-F cars.

Prairie du Chien, Wis.—Brunton & Foss, operating the Prairie City garage, have dissolved partnership and the business will be continued by Mr. Foss. Mr. Brunton goes to Beloit, Wis., to engage in the garage business.

Toledo, O.—The Mallory Transportation and Storage Co., of Toledo, will be incorporated within the next few days with a capital stock of $150,000. It is the purpose of the new organization to give manufacturers and other firms and individuals who have a large amount of heavy carting the advantage of a large fleet of motor trucks without the necessity of purchasing them. It is the plan to purchase twenty-eight trucks of various kinds for the use of those who desire them.

Wymore, Neb.—The Lyons Automobile Co. has bought out the busines of E. W. Severance & Son.

Indianapolis, Ind.—J. C. Donahue has resigned as manager of the Clark Motor Car Co., of Shelbyville, Ind.

San Diego, Cal.—The Hunt Automobile Co. of San Diego has secured the agency for the Overland cars.

Lima, O.—The A. D. Maus Auto Co., of 114 East Elm street, has taken the agency for the Mitchell for 1912.

Omaha, Neb.—F. C. McCann, of Woodbine, Ia., has secured the agency for the Nyberg car, from the Racine-Sattley Co., of Omaha.

Omaha, Neb.—Guy L. Smith, agent of the Hudson, has granted the agency for this car for St. Paul, Neb., to Charles Guggenman.

Toledo, O.—J. Lee Bowers has resigned his position with the United-Motor-Toledo Co., to accept a position in the southwestern states where he will sell Marion cars.

Indianapolis, Ind.—John G. Wood, manager of the Empire Motor Car Co., is in Europe. Upon his return he will associate himself with the Indiana Die-Casting Development Co.

Seattle, Wash.—J. M. Stehman, formerly with J. W. Leavitt & Co., is now connected with the Mitchell Motor Car Co. of Seattle, and will represent the company in all the northwest territory outside of Seattle.

Los Angeles, Cal.—The Studebaker Corporation has moved its Los Angeles branch to its new building at 1620-22-24 East Seventh street. The R. C. H. Sales Agency wil occupy the quarters recently vacated by the Studebaker company.

Kansas City, Mo.—The Kansas City branch distributing house and service station of the Remy Electric Co., of Anderson, Ind., maker of Remy magnetos, has been moved from 416 East Fifteenth street to 509 East Fifteenth street.

Boston, Mass.—The Shean Auto Station of Springfield, Mass., has the Velie agency for Springfield and adjoining towns. Amos J. Shorey has closed for the Velie in the northern counties in Maine, with headquarters in Bangor. J. T. Curtis & Co., of Simsbury, Conn., have closed for southern counties in Connecticut for the Velie, with headquarters in Hartford. George H. Snell, of Attleboro, Mass., has closed for Attleboro and adjoining territory; Arthur Beharrell for Lowell, and Walter B. Johnson for Essex Junction, Vt., has taken the Velie representation again for the state of Vermont. Lord Brothers, of Tilton, N. H., represent the Velie in that territory.

Portland, Ore.—The Nob Hill Garage and Auto Co. has taken over the Portland agency for the American.

Sheboygan, Wis.—Dr. H. A. Wagner and M. G. Dohme are building a garage at 1519 North Sixth street.

Battle Creek, Neb.—Fuerst & Huerman will erect a new garage here, the work on it starting in the near future.

Kansas City, Mo.—The K. C. Auburn Automobile Co. has moved to the southwest corner of Seventeenth and Grand avenue.

Kent, O.—The Criterion Motor Car Co., having secured backing from Pittsburgh, is contemplating the erection of a factory in this city.

San Francisco, Cal.—The Bay City garage has taken the agency for the Everitt cars in San Diego and is located at Fifth and Ash streets.

San Diego, Cal.—W. Pitt Fessenden, formerly of Los Angeles, has taken charge of the William R. Ruess Automobile Co. in San Diego and will handle the Pope-Hartford cars.

Atlanta, Ga.—The Locomobile Co. of America has secured 236 Peachtree street as a permanent location for its southern branch. Show rooms, offices and repair shops will all be located in that building.

Seattle, Wash.—C. W. Dansie, for some time past with the Olympic Motor Car Co. of Seattle, has been promoted to the managership of the firm. The company handles the Everitt, Chalmers, Herreshoff and Pope-Hartford lines.

Davenport, Ia.—The Dillon Auto Co., handling the Waverley electric, Regal and Hupp-Yates truck, has been dissolved, articles having been filed with County Recorder Holm of Scott county. Edward J. Dillon was president of the company.

Omaha, Neb.—The Lininger Implement Co., of Omaha, has closed a deal with the Lincoln Motor Car Works, of Chicago, whereby it will act as distributor for Lincoln light delivery wagons throughout the states of Nebraska and Wyoming.

San Francisco, Cal.—John H. Eagal, vice-president of the Oldsmobile Co. of California and manager of the Oldsmobile branch in Los Angeles, has been appointed general Pacific coast representative of the Olds Motor Works at Lansing, Mich., and manager of the new San Francisco branch. David L. Whitford has been transferred from San Francisco to Los Angeles, where he will be in charge of the southern California territory. Eagal's district will be California, Oregon, Washington, Idaho,

Nevada and Arizona. W. Folberth, the Oldsmobile factory engineer, will make his headquarters in San Francisco.

Kalispell, Mont.—Knight & Twining are erecting a one-story brick and concrete garage on First avenue east.

Wilmington, Del.—The Auto Sales Co., a local concern, has begun the manufacture of a motor truck of its own design.

Chicago—The Velie Motor Vehicle Co.'s Chicago branch has closed a contract with C. H. Voegele, Mansfield, Ohio, for the sale of Velie cars.

Janesville, Wis. — Edward Kemmerer has commenced work on the construction of a brick and steel garage building to contain 15,000 square feet of floor space.

Chicago—The Chicago branch of the Moline Automobile Co. has been moved to 2615 Michigan avenue from former headquarters with the Quality Car Co., at 2329 Michigan avenue.

Conneaut, O.—The Trio Horn Mfg. Co. has been incorporated with a capital of $25,000 to manufacture patented motor horns and other accessories. The incorporators are Ira E. Stump, B. E. Thayer, W. A. Middleton, Fred Eckert and F. B. Kavanaugh.

San Francisco, Cal.—The Nester Electric Vehicle Co., with the Edison storage battery as the foundation, has moved into offices at Golden Gate avenue and Hyde street, and will handle Bailey electrics, Ohio electrics and Lansden commercial wagons.

Omaha, Neb.—The Mitchell Motor Co. has moved from its old location across the street to 2050 Farnam street and will be one door east of the Rambler Motor Co. One of the large warehouses of the city will still be retained for a storeroom for Mitchell cars.

Cleveland, O.—Upon the application of the Panama Rubber and Supply Co., the Columbia Refining Co., the Cleveland Auto Top and Trimming Co., and the M. & M. Co., an accessory house, A. J. Schur has been named receiver for the Kissel Kar Co., a local concern.

Los Angeles, Cal.—The Michelin Tire Co. has opened sales quarters at 749 South San Pedro street. Michelin has introduced an innovation in the Los Angeles tire business by establishing in a wholesale warehouse instead of opening a retail store. The new warehouse will be under the direction of J. R. Wells.

Milwaukee, Wis.—Under the reorganization of the Wisconsin agency of the Packard, the Welch Brothers Motor Car Co. retires from the gasoline car selling field entirely. The Packard agency becomes a direct factory branch for Wisconsin and will be in direct charge of O. G. Heffinger, formerly of the Packard works, who has bee associated with the Welch brothers for some time. R. C. Chidester is sales manager and H. W. Liddle has charge of the technical department. The agency will continue to occupy the large seven-story Welch building at Grand avenue and Seventh street.

Cincinnati, O.—The Fischer Motor Car Co. has leased quarters at 808 Sycamore street. The Speedwell line is carried.

Owosso, Mich.—The stockholders of the Owosso Motor Truck Co., at a recent meeting, decided to discontinue the business.

Riverside, Cal.—The Kisselkar agency for Riverside has been placed with Charles Dundas, who will distribute these cars in the orange district.

Anderson, Ind.—Roy Watts has joined the forces of the Remy Electric Co., maker of the Remy magneto ignition devices, as a special traveling sales representative.

Des Moines, Ia.—The Sunderlin & Simpson Auto Co. and the Lagerquist Carriage and Auto Co. have been consolidated, the Lagerquist people buying out the others. The plant of the Sunderlin & Simpson company will be discontinued and the business carried on at 514 Second street.

Norwalk, O.—Trustee A. J. Schur of the defunct Norwalk Motor Car Co., which has been in the hands of receivers for some time, failed to sell the plant of the company when it was offered for sale recently. Representatives from the Model Gas Engine Co., of Peru, Ind., the largest creditor, were present to bid on the property. Before leaving a proposition was made by that concern to purchase the property at private sale.

Recent Incorporations

Cordele, Ga.—Cordele Automobile and Supply Co., capital stock $10,000.

Hendersonville, N. C.—Corbitt Automobile Co., capital stock $100,000; incorporators, R. J. Corbitt and others.

Memphis, Tenn.—Stewart Automobile Co., capital stock $8,000; incorporators, R. G. Stewart, E. F. Perry and L. LeMay.

Memphis, Tenn.—Chalmers Memphis Co., capital stock $5,000; incorporators, H. C. Luckett, J. M. Stoeckle and P. W. Lytle.

Buffalo, N. Y.—Whyland-Nelson Motor Car Co., capital stock $10,000; to manufacture motors and motor vehicles; incorporators, Joel W. Nelson and Frank W. Whyland.

Indiana Harbor, Ind.—Central Auto Supply Co., capital stock $600; directors, C. C. Robinson, F. E. Stephens and B. S. Gardner.

Pittsburg, Pa.—Krupp Motors Co., capital stock $250,000; to manufacture, sell and deal in motor vehicles; incorporators, D. Morgan, J. H. Anderson and James McMoran.

Portland, Me.—Hamlin-Foster Auto Co., capital stock $100,000; repair and deal in motor cars, and conduct motor school; incorporators, A. D. Hamlin and A. S. Ventres.

Marion, O.—Auto Machine Co., capital stock $10,000; incorporators, R. E. Breed, Sr., G. D. Lindsey and Blaine Tong.

New York—United Automobile Owners' Protective Association, capital stock $25,000; to deal in motor supplies, etc.; incorporators, H. A. Trebing, H. A. Troid and A. Davenport.

New York—International Motor Service Association, capital stock $100,000; to manufacture motor cars, etc.; incorporators, W. H. Brearley, W. W. Friend and I. A. Monsees.

New York—City Taxicab Co., capital stock $10,000; to conduct taxicab business; incorporators, A. J. Smith, W. Oakford and F. M. Oakford.

New York—Motor Trades Publishing Co., capital stock $20,000; to do printing and publishing; incorporators, E. M. Hardy, E. C. Colgan and S. K. Ellenbogen.

New York—Service, Inc., capital stock $100,000; mercantile motor car agency; incorporators, David M. Hooks, T. B. Nixbet and Frank C. Carr.

Syracuse, N. Y.—Robert M. Barker has been made advertising manager of the Chase Motor Truck Co., of Syracuse.

Watertown, Wis.—G. H. Hafemeister has established a garage and repair business at 211 North Third street and will handle the Ford exclusively.

DePere, Wis.—Toonen & Barlament have purchased a site for a garage to cost $7,500. It will be two stories high, of fireproof construction, 50 by 60 feet in size.

Seattle, Wash.—William O. McKay and J. D. Thomas will open the Locomobile agency for Seattle. The Thomas-McKay Co., Inc., will have temporary quarters at 211 Broadway, north.

Cincinnati, O.—The Fisher Auto and Service Co. has been incorporated with a capital of $30,000 to deal in cars, parts and accessories and do a garage business. The incorporators are Arthur F. Fisher, H. J. Guckenberger, George C. Bauer, George Guckenberger and William J. Fleming.

Lincoln, Neb.—The Hitchcock Motor Co. has recently been incorporated here, with a capital stock of $24,000. The incorporators are A. F. Hitchcock, R. E. Hitchcock, C. F. Allen, P. O. Cover and W. E. Plumer, the first named being president. The company will handle the Inter-State.

Wilmington, Del.—Colonel Grantley P. Postels, Coleman B. Harris and Henry G. Kurtz have formed a partnership to handle motor cars and have established themselves at 220 West Tenth street. The firm will have the agency for the Mack truck and the Thomas, Cadillac and Bergdoll cars.

San Francisco, Cal.—R. H. Ingersoll has been appointed manager of the Keaton Vulcanizing Works, distributor of Swinehart tires in northern California. For the past few years he has been manager of the Diamond Rubber Co.'s uptown branch. That position has now been filled by the appointment of J. A. Jones.

Spokane, Wash.—The Washington Motor Vehicle Co., distributor of Baker electrics in Spokane, of which Harry G. Hawkins was the head, gave way to H. G. Hawkins, last week. The new agency will be at 818-20 Fourth avenue. R. C. Norton is the newly elected secretary-treasurer of the agency, with O. B. Henderson sales manager.

Portland, Ore.—Several new Mitchell agencies have been placed in the northwest during the past month, among which were the Ellensburg Auto Co. of Ellensburg, Wash.; Milton garage, of Milton, Ore., and the Simonton Motor Co., of Salem, Ore. The Mitchell will be represented in Portland by Dulmage & Smith. J. B. Knight is handling the Mitchell in the Grays Harbor country, with headquarters in Aberdeen, Wash.

Legal Lights and Side Lights

CHICAGO'S NEW LAW

IN Chicago this week a new rule, adopted by the municipal court largely through the efforts of Judge Gemmill, went into effect. This provides that motorists arrested for speeding or other violations of the motor law may sign their own bonds. The new rule is as follows:

"In all cases of arrest upon view without a warrant by an officer for the violation of a municipal ordinance of a teamster or owner of a vehicle, charged with operating the same without a license, or without having paid the vehicle tax, or with blockading traffic, and in all cases of peddlers upon wagons charged with peddling without a license or with crying their wares, and in all cases of arrest on view of the owners or drivers of motor cars, motor trucks or motor cycles, or failure to comply with the state law or municipal code or with the ordinances of any park board within said city requiring a license or the payment of a wheel tax, or for the manner of lighting or attaching number to such vehicle, or for violation of any smoke or noise ordinance, or the owner or driver of a motor car, motor truck or motor cycle charged with violating the speed laws of the state of Illinois or the city of Chicago, or of any park board within said city, where no personal injury has resulted to anyone on account of such driving, the person so arrested shall at once be taken to the police station and immediately released upon signing his individual bond in the sum of $400, requiring him to appear on the following court day for trial upon the person arrested making and delivering to the desk sergeant or other officer in charge of the station, an affidavit setting forth his name, that he is a resident of the city of Chicago, his place of residence and his place of business, with whom residing, occupation, by whom employed, and the place of business of his employment, and in the case of the arrest of the driver of a vehicle or motor car, the correct name and home and business address of the owner thereof.

"Provided, however, that in all cases of arrest for speeding where personal injury has resulted to anyone, or where the driver of the vehicle or motor car is intoxicated, a bond with proper surety shall be required."

MEANS MIX-UP IN WISCONSIN

Wisconsin motorists anticipate a fine tangle when the department of state attempts to supply registrations and licenses to the 28,000 owners of the state between December 15 and 31. The secretary of state recently announced that no applications for 1912 licenses would be received earlier than December 15, whereas it had been announced previously that they would be received on and after December 1. Unless the motor car registration division of the state department is greatly enlarged in point of employes and efficiency, a hiatus may be expected. The new law requiring annual registration provides that no motor vehicle shall be operated unless registered and bearing its proper registration number plates. There are no days of grace and this means that each of the 28,000 owners must have the plates in place on their cars by midnight of December 31, 1911, if they wish to operate them on and after January 1, 1912.

UNREGISTERED CAR A TRESPASSER

That the driver of an unregistered car is a trespasser on the public highway, and, if the machine is injured by a collision with a street car, cannot hold the trolley company liable unless the injury was wilfully and wantonly done, is the decision filed in the common pleas court of York county, Pennsylvania, by Judge Wanner. The case in which this ruling was made is that of N. H. Bortner against the York Street Railways Co., in which a verdict of $358 was rendered March 23, 1911, for the plaintiff for the demolition of his car in a collision with a trolley car in West York borough. At the time of the accident the plaintiff's car was unregistered and he had no license to operate it in Maryland, where he resided, or in this state.

QUESTION TAX LEGALITY

In the event that the recent opinion of the attorney general of Oregon is correct relative to the taxation of corporations and the right of the counties to debar the state from collecting inheritance taxes and corporation taxes under the county tax amendment, and that his interpretation is equally correct that such taxes are realty taxes, then it is held by good authorities that the motor vehicle law which was passed by the last Oregon legislature is unconstitutional as far as securing revenue through its provisions is concerned, and the $23,727 which has so far been collected under the law has been collected illegally.

The entire question seems to hinge on whether the collection of such registration fees is for the police regulation or whether it is for revenue purposes. If it is for the revenue purposes the county tax amendment is clear on the point that no bill for the regulation of taxation or exemption shall become a law until it has been referred to a vote of the people. This motor vehicle law was passed after such amendment became effective and has never been referred to a vote of the people. It contains no provision that the fees shall be used for regulation.

Deputy Attorney VanWinkle in an offhand opinion, when questioned relative to the points involved, took the attitude that in reality the money derived from registration vehicles is money that is collected for revenue purposes.

Under the act the secretary of state collects the fees for registration and they are turned over to the state treasurer, who places them in the motor vehicle fund. At the close of the year, after the cost of conducting the motor car department is deducted, the state treasurer turns the balance of the money into the general fund. By doing this it distinctly becomes revenue for the benefit of the state and in consequence it is argued that the registration fees primarily are collected as a tax and motor vehicle law, it is asserted, would fall under the inhibition of the county tax amendment.

Inasmuch as the Portland Automobile Association hopes to take the various questions in connection with the motor vehicle law up to the supreme court at the earliest possible moment, it is thought likely that this newly discovered point may be brought up as well. In that event and if the supreme court should hold that such registration fees did amount to taxes or revenue, and the law was found to be unconstitutional it would be necessary to submit it to the people at the next general election.

CASE INTERESTING TO DEALERS

A case of considerable interest to dealers has just been settled in the circuit court at Jefferson, Wis., by Judge George Grimm. E. G. Buroff, owner of a garage and agent for the Overland in Watertown, Wis., brought suit against a certain Schnittger to hold the latter to an alleged contract to putchase a car. It was shown by the testimony that an agent of Buroff, in making a sale of a car to Schnittger signed Schnittger's name to a contract for the car after he had refused to sign anything, although in a half-hearted manner said the agent could sign his name. Schnittger purchased another make of car and Buroff brought suit to hold him to the contract. Judge Grimm granted the motion of the defendant to non-suit the case on the ground that no contract existed between the parties.

STARTING EDUCATIONAL CRUSADE

A crusade against violations of the laws relating to the storage and handling of gasoline and oils is planned at Kenosha, Wis., by the state department of inspection of illuminating oils, which has of late found scores of violations in various cities. The chief offenders seem to be garagekeepers, but it is believed that a lack of knowledge of the real intent of the statutes is responsible for the violations. The crusade, therefore, will be mainly educational.